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Beck's New Improved Self-Adjusting Vise.

Mechanics are generally aware that vises with parallel jaws, are a source of great perplexity and loss of time when they are used in finishing anything but plain, parallel work. If the faces of the piece to be clamped incline towards each other at all, the piece—if wood—becomes badly defaced; and—if metal—while it is more or less defaced, according to its quality, it is also submitted to unequal side strain, which renders the danger of breakage much more imminent.

To obviate these difficulties it has been customary in times past to employ clumsy make-shifts extemporized for emergencies as they arise, such as angular blocks of wood or metal, lead plates, etc., familiar to all machinists.

These facts are justly held by the inventor of the device which forms the subject of the present article, as demonstrating the faulty character of the principle of uniform parallelism in the jaws of vises, and sufficient to entitle it to be called unphilosophical and unmechanical.

This fact has long been admitted by others, as the numerous attempts which have been made to produce a good vise with jaws adjustable to any ordinary kind of work, amply prove.

Our engravings show distinctly an improved construction of this essential implement, which, it is claimed, is free from the numerous defects which have hitherto prevented the general adoption of vises with adjustable jaws. These defects have been, for the most part, loss of leverage, unequal strain, and undue complication, which rendered them expensive to manufacture or repair.

We may mention as tending to establish the claims of this inventor, that on pages 175 and 221, Vol. XXI., of this journal, were published advertisements challenging a competitive trial of these vises with any other whatsoever at the National Fair of the Maryland Institute held at Baltimore last fall, and that the judges awarded the highest premium to the exhibitor of these vises. The inventor is satisfied that these vises, if left on trial (as he is willing to do where any doubt exists as to their merits), will secure preference from practical mechanics over any others in market.

Fig. 1 is a perspective view of the Machinists' Vise adapted not only to their use, but to the needs of metal-workers in general. Fig. 2 is a sectional view of the outer jaw of the same vise, and its attachments.

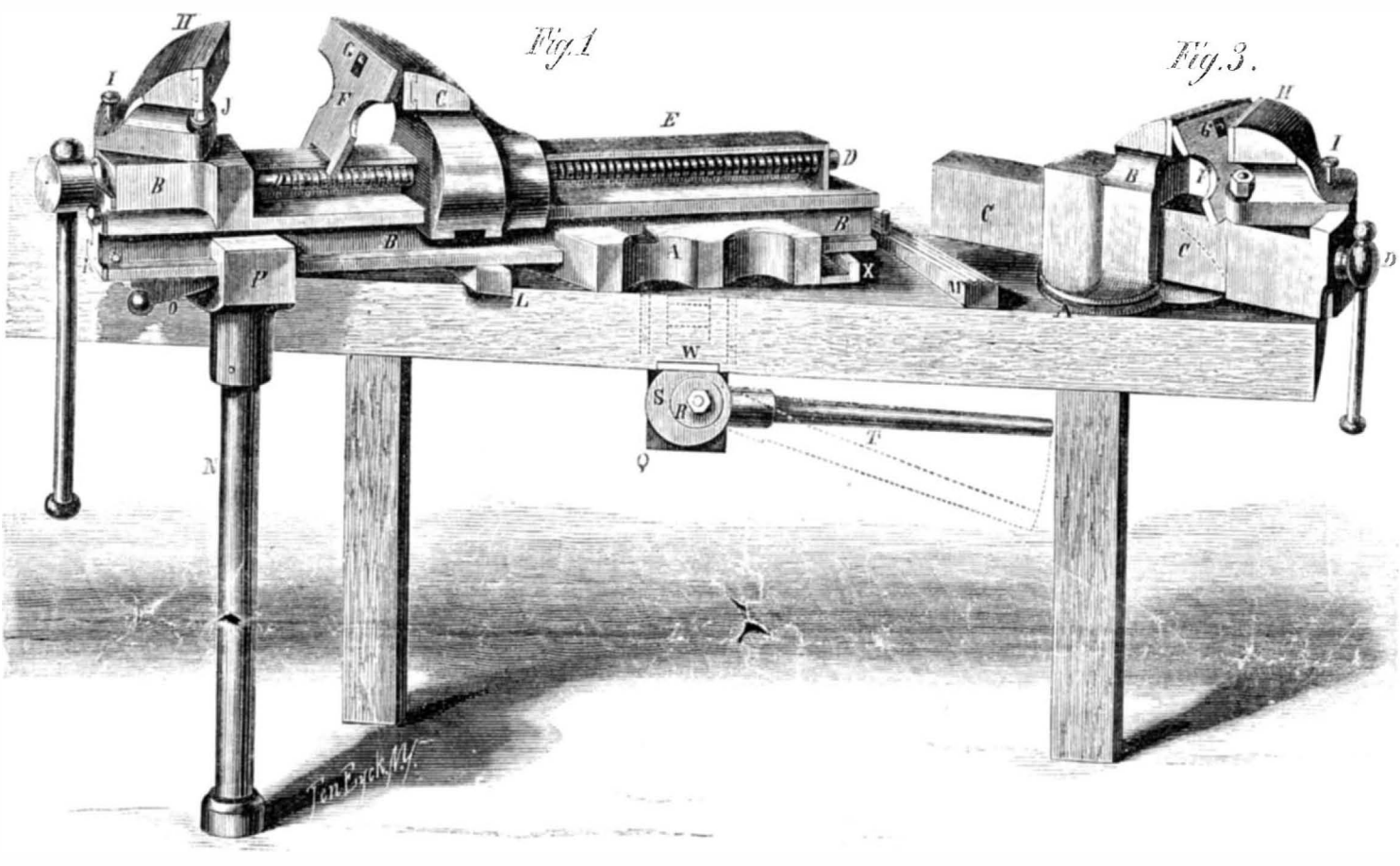
A, Fig. 1, is the bed-plate of the vise, in which the extension bar, B, Figs. 1 and 2, slides. C, Fig. 1, is a movable jaw, operated by the screw, D. The screw, D, is swiveled to the ends of the shield, E, Figs. 1 and 2, which ends are turned down at right angles, serving to keep the screw clean. The parts, A, C, B, are held together by corresponding flanges. The bed-plate, A, Fig. 1, has a socket shown in dotted outline, cast solid with it, which enters the bench, and is connected with the clamping bar, Q, by a pivot bolt. This bolt has a side partly flattened, as a bearing for a key which enters the clamping bar, Q; this prevents the nut from working loose.

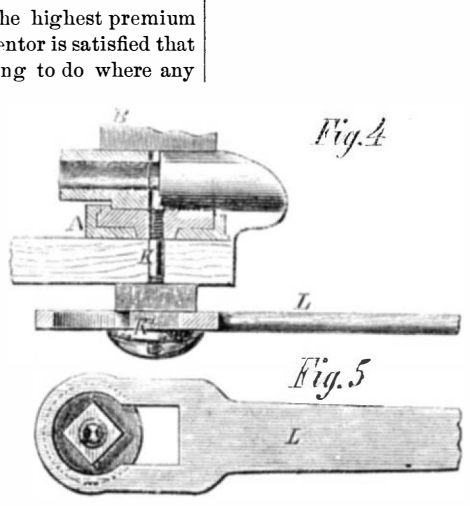
S is an eccentric of chilled iron, having a socket for the lever, T. S is connected with the clamping bar, Q, by a bolt and washer, R, the bolt being held by a keyed nut not shown.

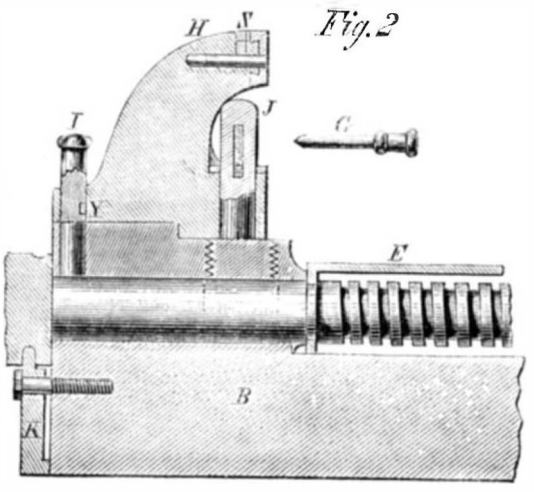
W is a metallic plate secured to the bench upon which the eccentric, S, works. It may in most cases be desirable to use the adjustable lever, L, shown in Figs. 4 and 5, instead of the lever and eccentric, S and T, and the bar, Q.

M, Fig. 1, is a corrugated steel key shown removed from an inclined bearing plate, X, Fig. 1, which has a projection dovetailed into A. The key, M, is kept from working out of place by a pin shown in the small end. By elevating the cam lever, S, T, the entire vise can be swung into various angles and positions, and clamped therein by pressing the key, M, with the thumb, and depressing the lever, T, to the position shown by the dotted line; the parts, A and B, being simultaneously clamped, and the whole held with great firmness.

In heavy chipping, the post N, is employed to strengthen and support the other parts of the vise, it being attached to the extension bar, B, by a socket and clutch, P, and adjusted to rest upon the floor by a tapered key, O. This key is also secured by a small pin placed near its point. The post, N, may be metal, but is preferably made of wood, which answers all purposes and is much cheaper.







K, Fig. 1, is an adjustable semi-collar, fitted to a circular groove in the screw-head, and secured to B by a bolt, by which it is instantly adjusted to take up the wear of the screw.

H, Figs. 1 and 2, is a horizontally or laterally adjustable jaw, having a semi-circular shoulder fitted into a corresponding recess of the extension bar, B, shown in section in Fig. 2. It is held down by a pivot stud, J, Figs. 1 and 2, which is screwed into the bar B, as shown in Fig. 2 by the dotted lines, connecting pin, G, Figs. 1 and 2, is secured. The latter is pointed, and it is flattened near its head, and forced tightly through the slot, so that it has no play. This jaw, F, is quickly attached to the jaw, C, by means of the connecting pin, G, similar to the one shown in the jaw H, Fig. 2. It is held from working loose by a block of leather placed tightly in a vertical hole in the jaw, and compressed by a screw, as at Z, Fig. 2. The lower part of the jaw F, is notched as shown in Fig. 1, to slide on the shield, E, and its rear side which rests against the jaw C, has the form of a segment of a cylinder which causes it to automatically adjust itself to the face of a beveled piece, and the jaw, H, being also automatically adjustable the whole forms a universally adjustable vise, by which any plain tapering or beveled piece of work may be securely held in any position for facility and convenience in working without defacing it or subjecting the vise to injurious side strains, resulting from clamping angular work in parallel vises.

The movement of the jaws may be reversed by loosening the key, M, and placing the key, L, Fig. 1, in the notch of the plate, A, and the jaw, C; which then becomes fixed, and the jaw, H, movable.

The post, N, can be readily attached to A, by means of a hook not shown, and instantly adjusted to any point desired. Fig. 3 represents a vise designed for wood workers and light metal working; and Fig. 4 is a longitudinal section of the same through the jaw, B, and clamping plate, A. The latter, which is securely bolted to the bench, has a circular conical flange, in which the base of the jaw, B, revolves. It has also a projecting flange, which forms a solid support for the nut, and also for the extension bar, C, which slides on a shoulder of the same, as shown in Fig. 4, and in dotted outline in Fig. 3. As the screw, D, passes through this flange,

This mode of attachment also allows of compensation for such wear as may occur through long use, and allows the jaw, H, to be lowered or tightened at pleasure, and turned at will about the pivot, J, to any required angle.

I, Figs. 1 and 2, is a steel pin, which holds the jaw, H, in a parallel position, when parallel work is clamped. It has a small rubber block placed in a hole at its lower end which keeps it from slipping down while the workman is adjusting the jaw H. This rubber is shown at Y, Fig. 2. F is a vertically adjustable jaw, having a slot in which a

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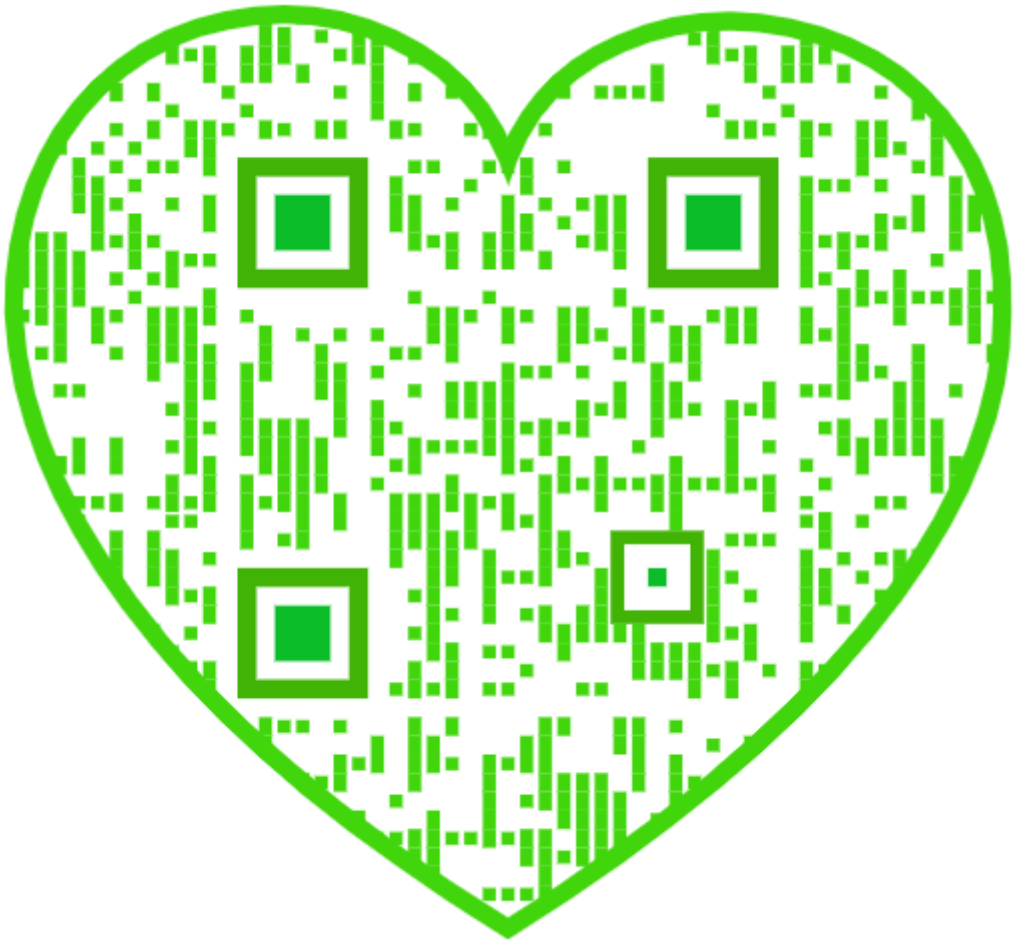

it may be made into a nut with a screw tap, and when worn out, a new nut may be substituted.

C is the extension bar, cast hollow to receive the nut, flange, and screw. It slides through the jaw, B. H is the adjustable and movable jaw. Its front part is secured to the bar, C, by a pivot bolt to which a nut is securely locked, which can be loosened or tightened at pleasure to compensate for wear. This bolt, when properly made, breaks before any other part, and it may be easily replaced, thus insuring more expensive parts against breakage.

The rear part of the jaw H, rests against a segmental shoulder, cast solid with the bar, C, by which leverage is gained and the durability of the jaw, H, is increased. This jaw may also be held in a parallel position by the pin, I, as in the Machinists' Vise.

K, Fig. 4, is a stud secured to the base of the jaw, B, and it passes through the center of the clamping plate, A, and bench, into the nut K', Figs. 4 and 5. This nut is cast with a flange, on which the adjustable wrench or lever is supported. This lever is easily adjusted to any side of the nut by pulling it so that the nut will be in the circular part of the aperture, as shown in Fig. 5. When turned for a new grip, it is pushed so that the nut will be in the angular part of the aperture. This wrench can only be removed from the bolt by first taking off the nut.

The vise may be firmly and easily clamped at any desired angle with the edge of the bench. The rear part of the vise is held down by three segmental shoulders or projections cast solid with the flange of the clamping plate, A; and can only be placed in, or taken out, when turned to a position where places in the jaw correspond to the projections described.

This vise is the subject of several patents. For further particulars, rights, etc., address J. D. Beck, patentee, Liberty, Tioga county, Pa.

ON THE CONDITIONS AND LIMITS WHICH GOVERN THE PROPORTIONS OF ROTARY FANS.

Mr. Robert Briggs, in a paper recently read before the Institution of Civil Engineers, stated that, by the theoretical investigations of Redtenbacher and Rittinger, of MM. Combes and Peclet, and of Mr. Appold, as well as by the recent practice of constructors of fans, the conditions and the limits that would be attempted to be established were more or less acknowledged.

A rotary fan might be said to consist, primarily, of a certain number of tubular passages, which were rotated about a lineal axis at right angles to the direction of the passages, whereby a given volume of air, impelled either by centrifugal force, or by the shape given to the tubular passages radially, was moved at a determined pressure. In other words, it might be conceived that a shaft revolved, upon which was placed a disk or set of arms, to which disk or arms some blades or vanes were attached, the zone of blades or vanes having sides or a casing, either in close proximity to the edges of the blades or vanes, or attached to and made to revolve with them: and then the area inclosed between any two blades or vanes and the sides or casing might be considered as a tubular passage, with an entrance at the center of the fan and an exit at the periphery. The conclusions drawn by M. Péclet, from a course of reasoning based upon the tube example, were at variance with the experience of the author of the paper, and might be extended, first, to a tube closed at the axial end and open at the periphery, when the partial vacuum would correspond to that due from the velocity of a body of the density of the atmosphere at the time, falling with the velocity at which the extremity moved; and, secondly, to a tube closed at both ends, when, whatever might be the density of the inclosed atmosphere, the pressure on the axial end would be less than that on the outer end by that due from the velocity of a body of the density of the inclosed air, falling with the velocity at which the extremity moved. Hence, whatever the shape of the vanes of a fan, its maximum pressure or suction involved no delivery whatever, and if the fan were so proportioned that no regurgitations took place as the blades passed any point in the case, such a fan would consume no power when it was closed, either at the inlet or the outlet, or both, for it was performing no work. The condition was that of a fly-wheel at a uniform velocity, or a ball-governor with the balls spread to a running position. Now the pressure attainable by any rotary fan was an exceedingly low one, when considered in pounds per square inch; thus a column of water of 14 inches or 16 inches gave velocities dangerously near the strength of materials of which fans were constructed, in resisting centrifugal force, and a column of water of 7 inches or 8 inches was attainable only by very high speeds. In fact, a pressure or suction of 3 inches or 4 inches was nearly as large as could be economically attained, in delivering a quantity of air, when the friction of machinery at high velocities, the want of adhesion of belts, and certain other considerations of the friction of air on the vanes, were accounted for. Thus, the largest differences of pressure were less than the ordinary atmospheric disturbances, as indicated by the barometer.

It was possible to construct a series of fans, following from one to the other, and to increase the pressure by repeated efforts; and this method was applicable to many purposes where the volumes to be moved were beyond the scope of a pump, and the pressure was relatively low to that obtained from pumps. So far as volume was concerned, a very small fan represented the largest blowing engines at blast furnaces. This limit of efficiency, as regarded pressure, was the first limit of a rotary fan.

Since the terms, pressure on the one hand and suction on the other, were interchangeable, and did not vary so much as the atmosphere, it happened that the suction fan of the most economic proportions was identical with the blast fan best adapted for the performance of duty. This condition was regarded as of the highest importance in simplifying the study of the fan question.

But the propositions, that the fan of suction was that of blast, and that suction and pressure were interchangeable, implied and carried with them the conclusion, that the action derived from the shape of the blade should be the same on the entering air as on that leaving the fan. This condition, however, was only incident to one particular shape of blade, that was one where the angle of the blade at any point was constant with any radial line at that point—in other words, was a logarithmic spiral. This angle might be from 0° to 90°, that was, from a straight line to the impossible case of a series of concentric circles, but the shape would insure each part of the blade giving an impulse to the air in contact with it proportionate to the velocity of that point round the axis. Taking this form of blade, and supposing the air to be impelled with velocities proportionate to the radial distances from the axis, then the area of each concentric ring should diminish as the length of the radii increased. The calculations and the formula for determining the section of the cone of the fan from the mouth to the periphery were then given.

At the entrance of a fan, the direction of the currents of air was at right angles with the plane of rotation; and, in the case of the ordinary fan, taking in air at both sides, the two entering currents were directly opposed to each other. In the center between the currents there might be inserted a conoid, so shaped that each particle of air should preserve its uniform velocity, and be gradually diverted into the direction desired. The conoidal mouth of the fan should be of such a shape as to give a constant area to the passage formed between a newel, or corner round the mouth, and the surface of the conoid. The calculations and the formula demonstrating the outline of the conoid then were given. With this section of mouth, and that previously described for the zone of the blades (supposing them to be a logarithmic spiral), and with the supply of air which the velocity of the tips of the blades demanded, the air would enter with the least resistance until it reached the blades, would fill the fan whilst it was accelerated, and be discharged with maximum effect.

In a fan 10 feet in diameter, and only 2 feet in width at the circumference, and having 62·83 square feet of area of discharge, the openings on both sides should be 7·42 feet in diameter and 3·63 feet wide at the inner edge of the zone of blade. This left only 1·22 feet for the width of the zone of blades from the opening to the periphery. But the zone of blades was made as wide as two feet at the disk, so that the average width of the zone was 1·65 feet. Attention was directed to this departure from the usual proportions, to indicate the advantage of more than the ordinary number of blades, and the discussion would fail to be understood unless the opportunity, if not the necessity, of so doing were demonstrated.

After it was ascertained that any particular form and number of blades would produce the highest useful effect, at the pressure related to the velocity of the periphery of the fan, if it was desirable to have a higher pressure, it would be best obtained by giving a greater velocity to the fan, and not by altering the shape of the blades to a form of less efficiency; unless when the desired pressure approached the strength of the parts of the fan to resist centrifugal force, and it was advisable not to employ a fan of repeated effort, when the blades became beyond question radial, and the useful effect was secondary.

In the year 1856 and 1857, the author, who was then employed as one of the principal assistants upon the works of the United States Capitol Extension and the Washington Aqueduct, under the engineering charge of Captain (now Major-General) M. C. Meigs, had delegated to him the investigation of what form of fans should be employed in ventilating the buildings of the Capitol. A series of experiments with models, based on the reasoning adduced in the paper, gave as the best shape or curvature to the blades, that which had been indicated, a logarithmic spiral of 45°, and showed a loss of mechanical effect when, within the zone of blades, the number of blades employed exceeded that which allowed the heel or inner edge of one blade to much more than pass the point or outer edge of the next in a radial direction, or in the direction in which the current of air, when the maximum discharge was occurring, passed.

The same rule would hold good with fans having radial blades; for as then the direction of the current was at an angle of 45° to the radius vector, the overlapping of the opposite ends of the two contiguous blades in relation to the current would take place in the same way. Taking a fan of 10 feet in diameter of the proportions assumed, where the zone of blades had been stated to be 1·65 feet average width, about sixteen blades would be required for a fan with blades at angle of 45°, and about twenty-four for the same fan with radial blades. The fan here described was narrow, with a large opening on both sides, and numerous blades, as compared with the usual practice; but it possessed the merit of being the smallest in external diameter, of having the largest capacity, and the least surface friction compatible with the contact of the air with the blades.

It was not pretended that a fan of the usual proportions, with the diameter three or four times the opening at the side or mouth, and the relative width much greater than had been assumed, was radially inefficient; nor that even in such a case, if the number of blades were limited to four, six, or eight, or where the case was composed of flat plates, there was a total loss of efficiency. So far as the extremity of the blades merely rotated a mass of air which was not passed forward, no power was consumed, upon the principle of the tube closed at the inner end. The air could only be delivered so fast as, by the action of some part of the blade of a fan thus constructed, it could be induced to enter at the restricted openings at the side. But the rolling of compressed air, intercepted by the outer ends of the blades and the friction upon the enlarged surfaces, must consume more or less power.

A table was next given of the proportions of fans with less blades than had been assumed, showing that eight blades of 45°, or twelve radial ones, were the least number desirable, as a fan 10 feet in diameter then became only 0·62 foot in width at the tips of the blades.

The reasoning was adduced on which the calculations of quantities and pressures were based. It was urged that when all the resistances of the fans were considered, the unrestricted discharge with unrestricted supply would occur at one-half the velocity of the tips of the blades and the pressure to correspond, while the quantity would equal a discharge at that velocity through eighteenths the area of the fans at the tips.

Up to this point it had been possible to demonstrate by reasoning, or with the modification of some co-efficients, the proportions enumerated. But there were no accurately determined figures to show the relationship between the quantities of air discharged and the increased resistances. The instances in use, although numerous, about a hundred in fact, had been restricted to cases where ducts were employed, some or all of which had been closed off at one time, no regularity of working having been adopted; nor were there any experiments to show the variations of pressure, when the quantities were increased or diminished. The author had assumed, in giving the performance of fans, that double the unrestricted pressure could be got with half the quantity of air. This relationship seemed to be warranted by many results, where the quantity of air had been measured by an anemometer, and the pressure registered by a gage simultaneously; but the law of the relation of variation of quantity with pressure to this limit, or further limits, had not been determined. The ultimate pressure attainable for the discharge was four times, less 10 per cent, or 3·6 times the pressure of unrestricted discharge. The assumption that half the quantity would be delivered under double the pressure involved the passage of the current of air in a radial direction through the blade at half its unrestricted velocity, and the rotation of the air with the fan at such a rate that its centrifugal force should equal the double pressure assumed.

It should be borne in mind that this double pressure followed when the air was impelled tangentially at 0·707 the velocity of the tips of the blades, and that this was the speed which would be given to the current outwards, when there was an infinite number of frictionless blades, with the logarithmic curve of 45°. That there would be discharged quantities of air up to the limit of pressure was certain, but the economic effect of the fan fell off rapidly, as the blades were only moved at high velocities through a bath of air without producing proportionate results. With these estimates of unrestricted discharge and pressure, and the modification of a certain pressure up to double the unrestricted pressure, the limits of fans of proper proportions were brought to definite conclusions.

The general dimensions and description next followed of a 10-feet fan. It was stated that this construction of fan was also adapted to the ventilation of public buildings and to the supply of air for puddling and heating furnaces, for all of which purposes they were in common use in the United States.

In conclusion, tables were given of the presumed duty of fans for different uses, admitting of practical application to many purposes; including the capacities of a 10-feet fan, with an unrestricted discharge, and a discharge restricted to half the quantity, of fans to be used for the ventilation of public buildings or mines, for the supply of air under grates of puddling or heating furnaces, and to tweers, or cupolas, smiths' forges, hollow furnaces, etc. In each case the tables embraced the following particulars: The number of revolutions and the quantity of air delivered per minute, the pressure, the proper dimensions of the pulleys, and the horse-power required for the several conditions.

The Effect of Temperature on Coal Gas.

Of the many experiments which have from time to time been made on the illuminating power of coal gas under different conditions, very few, we believe, have been conducted with a view of ascertaining the extent to which that power is affected by the temperature to which the gas is exposed, and for this reason some experiments of this kind, which were not long ago carried out in the laboratory of the University of Munich, possess a special interest. In these experiments the illuminating power of the gas at the normal temperature of 64½° Fah. was taken as the standard, and the object was to compare, by means of a Bunsen's photometer, this illuminating power with that obtainable when the gas was burnt in the same burner at a higher or lower temperature. In order that this might be done, the burner was attached to a U-tube, which could be immersed either in a cooling mixture or in a liquid at an elevated temperature. The illuminating power at the normal temperature being represented by 100, it was found that when the U-tube was immersed in snow, so as to bring the temperature of the gas down to 32°, the illuminating power was reduced to from 76 to 85; while when a mixture of salt and snow was used to give a temperature of—4°, the illuminating power of the gas was reduced to from 33 to 40, or, in other words, it was only equal to about ⅓ of that which it possessed at the normal temperature. Of course such a temperature as—4° is

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one to which gas is never practically exposed, at all events, in this country; but the fact that even at a temperature of 32° there was found to be an average diminution of the illuminating power to the extent of about 20 per cent is an important one, well deserving of attention.

Heating the gas above its normal temperature was found to have far less influence upon its illuminating power than cooling it below that temperature, and this was a result which might have been expected, for reasons which we shall point out presently. By immersing the U-tube in boiling water, and thus raising the temperature of the gas to 212°, it was found that the illuminating power was increased to 104 (the illuminating power at the normal temperature being, as before, represented by 100), while when melted paraffine was substituted for the water, and the temperature thus increased to 288°, the illuminating power became 118. Thus while a reduction of temperature of about 32° lessened the illuminating power by about 20 per cent, an increase of temperature of 224° raised that power by about 18 per cent only. This state of affairs is readily explicable if we suppose the reduction of temperature in the former case to have been sufficient to cause the liquefaction of a portion of the hydrocarbons associated with the gas, as in that case the total amount of sensible and latent heat abstracted from the gas by the reduction of temperarure of 32° might even be greater than that imparted to it when its temperature was raised to 288°. In all the experiments the air for supporting combustion was, we believe, supplied at the normal temperature; but it would have been interesting if, in the case where the gas was cooled to 32° Fah., the light had been supplied with air at that temperature also, and notice taken of the effect.

In the course of the experiments it was found that, after the gas had for some time traversed the tube immersed in the cooling mixture, a thick coating of ice was deposited on the interior of the tube. The water resulting from the melting of this ice had a strong smell, was neutral to test papers, but when exposed to suitable tests gave a feeble reaction, showing the presence of cyanogen. With indigo carmine (sulphindigotate of potass) and sulphuric acid, it developed the blue color of indigo, and evolved the odor of nitro-benzine. To determine the amount of water carried by the gas a large quantity of the latter was caused to pass very slowly through a drying tube charged with pieces of pumice-stone soaked in sulphuric acid. A large number of experiments made in this way on the ordinary gas supplied to Munich showed the quantity to average about 1·6 grains per cubic foot.—*Engineering.*

The New Anæsthetic Chloral.

Professor John Darby, writing for the *American Grocer*, anticipates that not long hence, the vial of chloral will take its place beside the camphor bottle and other household remedies, displacing to a great degree, the paregoric and laudanum. Opium and its derivatives have held a high place in the esteem of mankind; and, after centuries of use, is to-day more highly prized than ever before. We have felt consoled that in our extremest agonies, we had within our reach an agent that could arrest or mitigate our sufferings, and give us ease and quiet. But, connected with the use of opium, there are sequelæ that are disagreeable. Headache, sickness of the stomach, loss of appetite, and other unpleasant results are sure to follow its administration. How much more highly should we esteem opium if these unpleasant consequences could be avoided. If we could command sleep and not suffer, on waking, as the price for our rest. If our pains could be relieved, and our deliverer would leave no sting behind.

Chloral seems to fulfill these conditions. It produces refreshing sleep from the most excruciating pains, and the sleeper awakes as from a natural sleep, with no unpleasant symptoms from the action of the chloral.

Chloral was discovered by Liebig, in 1832, and stood more than thirty years in the list of recorded discoveries, exciting no interest outside the field of chemistry. On the 2d of June, 1869, it was brought before the Medical Society of Berlin, Prussia, as a new hypnotic (producer of sleep) and anæsthetic, by Dr. Otto Liebreich. Pure chloral is a colorless fluid, with a sharp, pungent taste and odor, not disagreeable. When united with one atom of water it becomes a white solid, retaining its odor and taste. It is in this form that it occurs for use. It dissolves rapidly in water. It is not an anæsthetic as chloroform, protoxide of nitrogen, and ether are, as it does not usually produce insensibility when it produces sleep, unless given in large quantities. Its true influence is to produce sleep. When given to animals they go to sleep as naturally as though they had taken nothing. The cat is said to lie down, adjust her paws, and with her accustomed low purr, pass into the state of sleep, and after five or six hours, wake up naturally, as from her accustomed slumber. So in the human subject, it produces a peaceful sleep of any length of time, depending on the dose given.

The following points have been well established in regard to efficient doses of the hydrate of chloral:

1. It produces deep sleep quickly after administration.
2. The action produces no excitement.
3. No bad effects result from its action.
4. The brain is first affected, then the lungs, and lastly the heart. The heart is said to beat, when fatal doses have been taken, after all the other functions have ceased.

Extensive experiments have been made on the lower animals to develop the properties of chloral, and they have all been in conformity with the above principles. We select the following cases reported in European journals: An insane person, in a state of high excitement, was put to sleep in a few minutes by twenty grains of chloral and slept five hours. A woman with a very painful inflammation of the wrist-joint, was put to quiet sleep by forty grains of chloral. A lady, suffering internally from an intractable attack of sciatica, could not be relieved by morphine and atropa, took thirty grains of chloral, which produced a night of perfectly tranquil sleep, from which she awoke fresh and as well as from a natural slumber. A lady suffering from prolonged neuralgia, and all ordinary sedatives proved unavailing, when forty grains of chloral produced immediate relief.

In a case of comminuted fracture of the humerus, the patient became furiously maniacal, and every attempt to fix the limb proved abortive, although excessive doses of opium were given. Sixty grains of chloral were given, and in a quarter of an hour the patient was fast asleep and continued to sleep quietly until the next morning.

A woman who had been ill and without more than five minutes' sleep at a time for five weeks, who had been treated with opium and morphine without benefit, and who, after taking twenty-five grains of hydrate of chloral in two ounces of water at bedtime for three consecutive nights, completely recovered. Sound sleep was produced and her pulse, which at the beginning was 130, fell to 90. She did not complain of nausea or headache, or any other unpleasant feeling during the time she was taking the chloral.

In nervous excitement, preventing sleep, chloral acts with promptness and with no evil results. It is evidently indicated in a severe pain resulting from rheumatism, neuralgia, sprains, or dislocation. It reduces the animal temperature and affords relief in cases of fever attended with restlessness and excitement. It produces muscular relaxation, and must afford relief in the horrid torture produced by the passage of gall-stones or the gravel from the kidneys.

The action of chloral on the system is supposed to depend on the chemical fact that alkalies decompose it and produce chloroform and formic acid. The blood is alkaline, and as the chloral comes in contact with it chloroform is produced, and its appropriate effects follow. This takes place throughout the system, thus producing a universal effect, and not a local one, as when chloroform itself is taken.

Solar Motive Power.

We hear nothing further from Captain Ericsson's experiments in converting the sun's rays directly into motive power, and whatever results he has been able to obtain are, as yet, unpublished by that investigator. But public attention once aroused to the importance of the subject, does not seem likely to let it drop. A writer in the *British Quarterly Review* has taken it up, and states some very interesting facts relating to the general consideration of the subject in connection with the experiments of Mouchot.

The sun's issue of caloric has been variously represented. According to Sir J. Herschel, it would melt a pillar of ice 1,590 square miles at its base and 194,626 miles in hight in one second of time. According to Pouillet, it would liquefy a shell of ice ten and a half miles thick in a single day, though it encompassed the entire orb. According to Professor Tyndall, it is equal to the heat which would be yielded by a seam of coal sixteen and a half miles in depth were it fired and reduced to ashes. Large figures are generally very bewildering, and when M. Guillemin expresses the sun's deliveries of caloric by a row of twenty-five ciphers, preceded by 4,847, the effect upon the imagination is benumbing rather than exciting.

But the matter may be put in a more simple and accessible form. Calculating the caloric yielded by each square foot of the sun's surface every hour, as equivalent to that which would be given out by the combustion of 1,500 lbs. of coal, this would accomplish the work of upwards of 7,000 horses There is something overpowering in this conception, when we consider that it applies to the entire superficies of an enormous globe of more than 880,000 miles in diameter, and not to a few selected spots. We may have here and there on our own planet, steam engines doing the work of innumerable quadrupeds, but the idea of several thousands clustered—concentrated, we may say—on each square foot of the sun's area, and exerting their energies incessantly, is one which we cannot compass with much sense of success.

Let us, however, transfer the question of solar power to the surface of the earth. Our globe, of course, intercepts but a fractional part of these burning emanations—only about $\frac{1}{2150000001}$th of the whole, according to Herschel. But, relatively small, they are intrinsically enormous, for M. Guillemin observes that the quantity poured upon a single hectare of ground (2·47 acres) develops, under a thousand various forms, as much force as is equivalent to the continued labor of 4,163 horses. The vast amount of work our luminary could, therefore, execute as a mechanical agent, by means of his rays, even in the diffuse condition in which they reach this planet, has not failed to attract the attention of curious inquirers. Indeed, we might say, that the waste of valuable sunshine, which might do the duty of all the steam engines in the world, has excited the displeasure (wrath might be a better word) of more than one scientific economist. There are people who will always be indignant to think that Niagara cannot be employed to turn mills for grinding our corn, and Vesuvius converted into a forge to melt metal on the most stupendous scale. We plead guilty to a touch of the same temper. But, without indulging in philosophical covetousness, is it not distressing to know that the beams which play so unprofitably, in some respects, on many parts of our earth, might, if properly impounded and harnessed to cunningly-constructed machines, be compelled to serve mankind in a very useful and lucrative capacity?

So, at least, thinks Monsieur Mouchot.

On a fine day, at Paris, it was found that the sun's rays, playing upon a surface of one square meter (1·196 yards) communicated as much heat every minute as would suffice to raise at least one liter (1·76 pints) of ice-cold water to the boiling point. In other words, says our Frenchman, its effect was nearly equal to the theoretical duty of a single horse-power steam engine. There are places, however, on our globe where the sky is clearer, and the soil more arid, and where, consequently, the Lord of Day is known to stalk in burning splendor. Could not some of this radiance be captured by means of what M. Mouchot calls solar receivers? He announces that he has taken some practical steps toward the solution of this question. So far back as 1861 he showed the possibility of working a hot-air engine by the instrumentality of the sun's rays. Subsequently, having ascertained that he could generate seventeen liters of vapor in a minute by the use of a silver reflector, he attempted to drive a small steam engine by the agency of arrested sunshine. In 1866 he succeeded. Since, however, his experiments were made upon a restricted scale, this ingenious Frenchman recommends that they should be repeated in tropical countries, and with receivers of more magnificent dimensions. In his enthusiasm, he even indulges the hope that, some day, the invention will be transferred to the deserts, where industry will settle down, and establish important works, for the sake of the superior sunshine which those glowing tracts afford. Who will not sympathize with M. Mouchot, on learning that, according to his experiments, it would be practicable to collect, in an inexpensive way, fully three-fifths of the solar heat which falls upon our earth? Is it not a matter for many groans that, while the sum of the sun's influence upon our planet has been computed as equivalent to the labor of 217,316,000,000,000 horses, toiling day and night, not a single patent, so far as we know, has been taken out for an engine to be directly worked by sunbeams. Ours is certainly a wasteful world. A large portion of the warmth we might extract from our coal, goes idly up our chimneys; and it seems that the cheaper caloric which is sent us from our luminary is allowed to flow back into space without driving (by its immediate action) so much as a coffeemill, or performing any artificial mechanical duty for mankind.

Ivory Carving.

Those who are familiar with the working of this exquisite material, says the *London Builder*, are aware that no other substance lends itself with such facility to the highest skill of the artist. Capable, on the one hand, of a breadth and largeness of treatment equal to that to be attained by such a wood carver as Grinling Gibbons himself, it is susceptible, on the other hand, of a microscopic delicacy of finish equal to that of the Greek gem-cutters, which may be combined with a boldness of relief, and shadow of undercutting, equal to those of the modeling of Ghiberti.

The chief defect of ivory as a material is its loss of color by exposure to dirt or damp. This may be entirely prevented by proper care, and by exposure to light under glass. Under these conditions, ivory is inferior to gems alone in durability, as metals are subject to oxidation, and wood to cracking by change of hygrometric condition. The most delicate *camei* of Wedgwood are coarse, when viewed under the magnifying glass, in comparison with *camei* in ivory. Nor is shell capable of equal finish.

Ivory carving is not to be judged of by such productions as the rude little figures, the execution of which forms an industry at Dieppe. These are essentially wood toys, executed in a better material. Neither are the brooches, ear-rings, and other ornaments, now executed in London, to be considered as specimens of artistic work in ivory. The price at which they are sold is too low to allow of the exertion of artistic skill and taste worthy of the beauty of the material. A case of modern English carvings, exhibited at South Kensington, may be referred to as another example of inferior modern work in ivory.

On the other hand, the well-known set of six plaques, representing *amorini*, goats, satyrs, and vintage scenes, attributed to Il Fiamingo, may be cited as an example of the bold, broad style of carving for which ivory is eminently suitable. Of the *cameo*, or gem-like style of work, it difficult to name any publicly accessible example. Exquisite statuettes were produced, some thirty years ago, by machinery invented by Mr. Cheverton. But, in this case, the reduction, which made no allowance for the diminution of scale, revealed its merely mechanical mode of execution to the critical and educated eye. Very recently, a few modern French carvings of great beauty have been added to the collections at South Kensington.

The importance of offering some encouragement for the revival of one of the most charming branches of the sculptor's art, will become apparent to any one who should wish to sell, or in any to bring before public notice, a modern ivory carving, even if of a thoroughly artistic character. The first question with which he will be met is "Is it antique?" The second, "Is it foreign?" If neither of these questions is answered in the affirmative, neither dealer nor connoisseur will glace further at the object. Grace of design, purity of rendering, boldness or delicacy of touch, attract no admiration, if the work confess a modern English origin. "There is no sale for objects of that kind," says the dealer. "I take no interest in any but antique," says the connoisseur. A hideous triptych, boasting a consular date, or a clumsy Lot, embracing a one-legged damsel, but attributed to a Flemish chisel, may command a hundred guineas, while an English work of art—deserving the title—attracts no attention whatever.

A RAIN OF SAND.—A curious shower of sand took place in some parts of Italy on February 13th and 14th last, and has been described in the *Comptes Rendus*, by M. P. Denza. This memoir, says the *Chemical News*, contains the account of a very curious phenomenon—viz., rain in the southern parts of Italy, accompanied by a fall of a fine reddish sand, while, in the northern parts of that kingdom, snow fell, accompanied by the same substance.

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[For the Scientific American.]

THE COCKCHAFER AND ITS RAVAGES.

By Edward C. H. Day, of the School of Mines, Columbia College.]

(Concluded from page 362).

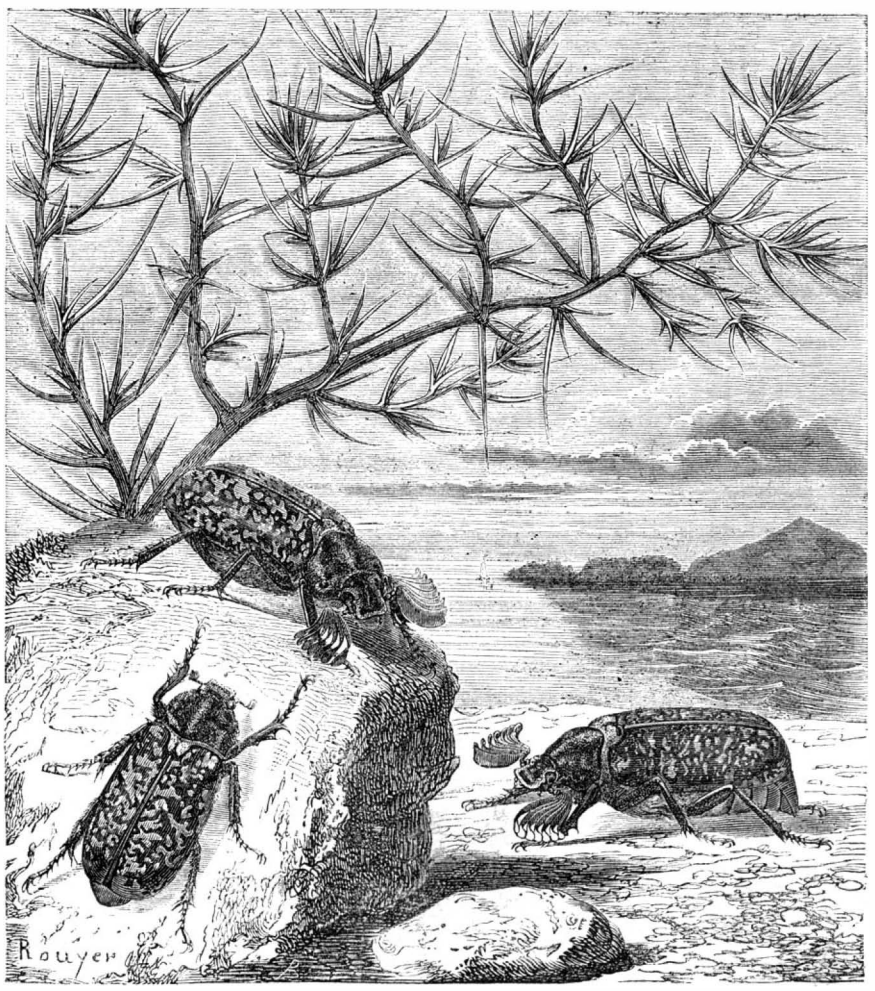
France and Germany suffer equally with Great Britain from the injuries of the cockchafer, and numerous have been the attempts made of late years to check an evil which had been allowed for centuries previously to grow upon the community. One plan followed is to select the perfect insects and destroy them; but even in this it seems that ignorance must have prevailed in some cases, as we find it suggested, that the beetles should not be buried as had been done—a course of proceeding that, as the slightest knowledge of their habits would show, would only have the result of considerately saving the pregnant females from the trouble of burying themselves! Of course the only way to be rid of them with certainty is to burn them as soon as caught. This hint applies equally to several American pests. In other cases the grubs have been collected, and it shows that the evil is still in the ascendant, and at the same time to what a really fearful extent it reaches, that, according to Prof. E. Blanchard, as late as 1866, a M. Jules Reiset caused to be collected, in only two Arrondissements of the Department of the "Seine-Inferieure," 160,000 kilogrammes of these *vers blancs*, as they are called in France. Nearly eighteen tuns, representing eighty millions of grubs! But do not rest here. As each worm before it was captured had consumed many times its own weight of food, this total weight represents many times eighteen tuns of roots consumed and injured; and each of these tuns of roots represents who shall say how many tuns of grass, of straw, and of grain destroyed? And how many hours of anxious labor wasted by the patient husbandman? And all this havoc, mark you! only in one year, in two small districts, in one region.

"Bugs" are not such trifles after all! It will at once occur to the thoughtful mind—Was there any one else, while M. Reiset was so patriotically engaged in his two Arrondissements, similarly occupied in the adjoining districts? Because, if not, it is but too certain that in the course of time some one will most assuredly have to do all his work over again. Just so! this is exactly what we wish you to realize. Thank heaven! we have not, as we said before, the *Melolontha vulgaris* in America; but we have hosts of insects almost as destructive in the same or in a multitude of other ways, and it is no use for Ezra Wideawake to keep his trees free from insects, if Micky Doolan, on the next lot, "just lets the nasty craythures alone," because he doesn't know any better; it is no use for Mr. Brown to encourage the birds to breed in his boxes in the spring, if the sons of Max Müller come over his land to "hunt" them with powder and shot in the fall. If insect pests are to be kept under, all hands must pull together; but the trouble is, that ninety-nine hands out of one hundred know nothing about the ropes; and this, though there are numbers of books and periodicals written on the subject. People do not care to read such books—despise them—because, in fact, they do not know *how* to read them, simply because they have not received that trifling amount of elementary instruction in natural history that would enable them to understand them without the trouble of some little extra thought; and that would give them a zest for, and a due appreciation of, the value of such natural knowledge.

The remedy is obvious, and it is the sole remedy sufficiently general to meet the case as it should be met. Let practical, well-digested instruction in the elements of natural science form part of the course of every school—public or private—so that every school boy and school girl may be led to take a pleasure in learning something besides empty words concerning the wisdom and beauty of Nature. They will then realize the nature and the importance of the part that insects play here beneficially, there injuriously, in the economy of mankind, and be energetic in taking measures to protect or destroy them, as the case may require. Do not, good reader, say you have read all this of insect ravages before; it is quite probable that you have done so, as Reaumur, Huber, Kirby, Harris, Packard, Walsh, Blanchard, and a host of others, have been drumming away on this tune to the community for years and years, and so far from endeavoring to give any novelties about insects, we are only stealing a little of their thunder wherewith to re-stimulate the readers of the SCIENTIFIC AMERICAN. Neither cry out "Pshaw! I have no garden and no fields; let the farmer and the entomologist settle this between them." If the farmer's crops are destroyed you will have to pay more for your bread; if the curculio gets to the plums first, you will not be able to buy them at all. You have, therefore, an interest in this great case of "the community *versus* cockchafers and others." As was done in the most recent *cause celèbre*, engage the best of private counsel for the prosecution, retain your own services, and plead energetically for the spread of knowledge in natural science among all classes.

The American species of Melolonthians, more or less closely allied to the common cockchafer, are very numerous; the several kinds of pine bugs, the vine-chafer, and the rose-chafer or rose bug, being perhaps the most familiar of these allies, though not the most closely related. In their habits, however, the June bugs closely resemble the cockchafers, and they have at times proved very destructive to vegetation, and probably much of their underground destruction is attributed to other causes. There is, however, a species of *Melolontha*, the *M. variolosa* or "scarred chafer" (so called from its coloration), which is a nearer relative of the European insect. It resembles the insect figured in our present engraving, which is the large and handsome *M. fullo*, in the very large leaf-like expansions at the ends of the antennæ, or feelers, of the males. In each of these expansions there are seven leaves, while in our common June bugs the observers will only find three.

The "scarred chafer," according to Harris, is confined to the coast and the islands in the vicinity. It is singular that the *M. fullo* is similarly restricted in Europe, not being distributed, like the common form, over the interior, but occurring only near the coasts of the English Channel, the Baltic Sea,

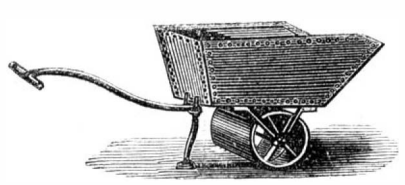


THE COCKCHAFER.—*Melolontha fullo.*

etc. It is one of the curiosities of insect history that attempts have been made in France to turn the cockchafers, when collected, to account, by extracting an oil from them. The oil obtained was said to be valuable for many purposes, but the manufacture, as might have been expected from the uncertainty of the supply, seems to have proved unsuccessful. Perhaps, according to the Rev. Henry Ward Beecher's seemingly paradoxical suggestion, that the Canada thistle would be easiest extirpated by cultivation, it may be advisable to attempt to raise June bugs for oil! Doubtless a host of their natural enemies would at once multiply indefinitely, and, combining with diseases as fatal as that of the silkworm,, soon put a stop to our oil works and effectually abolish the Melolonthians!

THE ROLLER BARROW.

The peculiarity of this ingenious English invention is, that it causes no unsightly scores or marks upon lawns or walks in wet weather, when the use of the ordinary wheelbarrow is a source of constant disfigurement. The *Ironmonger*, from which we copy the engraving, states that as a roller it is



easily worked by a boy, though it can be rendered of any weight desired by filling it up with ballast, the load being discharged at once by tipping the handle. It is very serviceable for bedding out plants, carrying away cut grass or turf, gathering up leaves, or when manuring the ground. The roller barrow is equally adapted for grass lands where horses and carts cannot be employed, and for croquet lawns, being always sufficiently light to be managed in case of need by a lady. It is in use at the Crystal Palace, Kensington, and other gardens, where its handy qualities have rendered it a permanent favorite.

DUBUQUE, Iowa, is very proud over the new cave recently discovered in its suburbs. This hole in the earth has stalactites and stalagmites, and all the modern improvements in the cave line.

The Electric Fulgurator.

The Plymouth Institution and Devon and Cornwall Natural History Society, England, was interested, at its recent *Conversazione*, by a display of the marvelous effects of a new electrical apparatus of enormous power, devised by Mr. J. N. Hearder, F.C.S., and constructed by him expressly for a scientific amateur, who had kindly permitted him to exhibit it to the society that evening. This extraordinary apparatus, to which Mr. Hearder has given the name of Electric Fulgurator, has for its objects the production of electric sparks or discharges of statical or frictional electricity of immense length, precisely resembling lightning flashes. The effect is produced by a peculiar arrangement of large Leyden jars, which are all insulated on separate glass pillars, 3 feet high, fixed in a frame, and connected by levers, which permit them to be joined together, either as an ordinary battery or turned into a position which connects the inner coating of each with the outer coating of the next. The jars are first charged as an electric battery from a powerful glass electrical machine, and when sufficiently charged, are suddenly dissevered from battery connection with each other, and are thrown into the intensity, or, as it is sometimes called, cascade position. The discharge takes place between the balls of a suitable discharger connected with each terminal. By this arrangement prodigious sparks of great length are obtained, resembling zig-zag flashes of lightning, accompanied by a loud report. The apparatus, consisting of thirteen Leyden jars, gave sparks in free air, of 3 feet 6 inches in length, very thick and crooked, and of a brilliant bluish white color. The deflagrating power of the apparatus, as exhibited in the combustion of metal leaves and wires, appears to be greater in the intensity than in the quantity arrangement. When this discharge is made to pass through heated air, its length is amazingly increased. Sixty-three small spirit lamps, each having two wicks, were arranged in a long ebonite trough, so as to form a line of 126 spirit flames, extending to the length of nine feet. Over these flames, a brilliant spark passed with such ease, from a moderate charge, that Mr. Hearder calculated that a full charge would be able to pass more than double the distance. When the charge was a little reduced the sparks still passed through the flames in a less brilliant form, but producing a bright spot immediately over the top of each wick, giving to the whole the appearance of a long string of brilliant beads. Mr. Hearder stated that, although this apparatus originated with him, it was not new, as regards date, for he had shown the society a similar arrangement, though on a very much smaller scale, more than forty years ago. Its present more imposing form was entirely due to the zeal and liberality of the gentleman before mentioned, who, being desirous of ascertaining to what extent the principle admitted of development, had given him an order to construct the apparatus now before the society.

The conclusions arrived at were, that with suitable apparatus and accommodation, and electrical machines of adequate power, the arrangement might be almost indefinitely extended, and that sparks of fifteen or twenty feet in length, in free air, would be by no means difficult of attainment. The present apparatus originally consisted of fifteen jars, which gave sparks five feet in free air. In conclusion, Mr. Hearder remarked that this apparatus opened a new field for electrical investigation in connection with the effects of quantity and intensity in relation to statical electricity, a subject never yet attempted for want of suitable apparatus, and he was bound to say that the results of the few experiments he had been able to make are such as could hardly have been predicated with our present notions of the action of the Leyden jar.

Protection of Lead Water Pipes.

A paragraph is going the rounds of the scientific journals and the newspapers generally, to the effect that Dr. Schwarz, of Breslau, has found a simple way of protecting lead pipes from the action of water, by forming on their inner surface an insoluble sulphide of lead. This is done by filling the pipes with a warm and concentrated solution of sulphide of potassium or of sodium, which is left in contact with the lead for about fifteen minutes.

This, says the Boston *Journal of Chemistry*, may be a new thing in Breslau, but more than two years ago we suggested a similar process as, on the whole, the best that we knew for the purpose. The directions we gave were as follows: Dissolve 1 pound of sulphide of potassium in two gallons of water, and let it remain in the pipe twelve hours, or until the inside is thoroughly blackened. The same recipe was given in Rolfe and Gillet's "Hand-book of Chemistry," published in 1868. The use of a warm saturated solution, as Dr. Schwarz directs, would do the work in shorter time, which might be more convenient in some cases.

BOILER TEST WANTED.—A correspondent suggests that all patent or non-patent boilers be tested publicly to ascertain their evaporative power, and thinks the Brooklyn Navy Yard would be a good place to do it. This suggestion supposes a state of willingness upon the part of everybody who has ever invented a boiler, and also on the part of the United States authorities, rather difficult we think to be realized.

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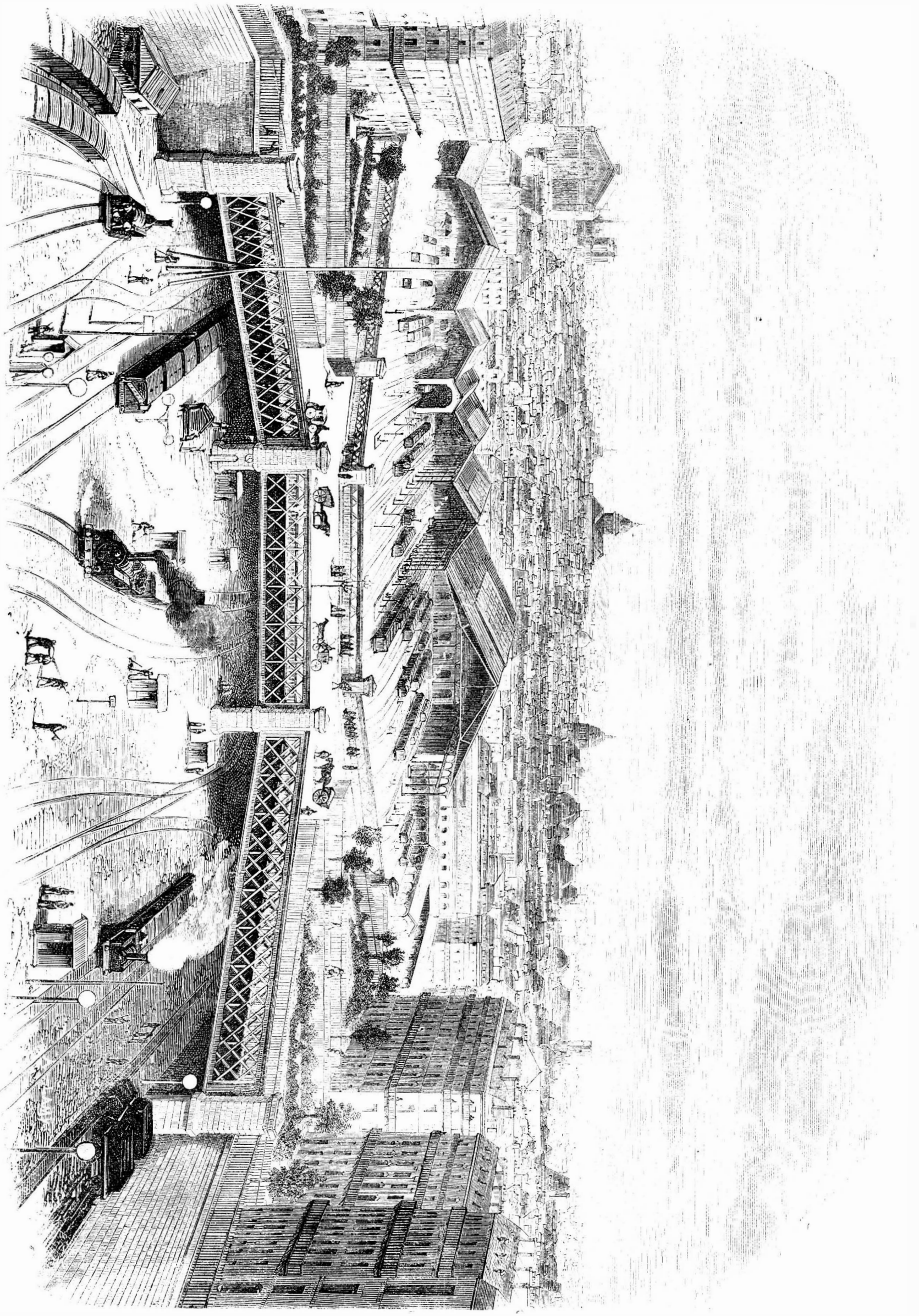
Bridge of the Western Line of Railroad in Paris.

We give our readers, in the present number, an engraving of an important work which considerably interested us when we were in Paris. As the subject of the intersection of streets by railways is one of great, and, in view of the rapid development of railway travel in and through cities, increasing importance, a brief description of this work, which the engraving will enable the reader easily to comprehend it, may be both useful and interesting.

We refer to the iron bridge upon the site of the old *Place de l'Europe*, in Paris, upon which several streets cross between thirty and forty rails of the Western line (*la ligne de l'Ouest*). Under the *Place de l'Europe* formerly passed two arched tunnels of stone; but to make room for passenger depots or platforms capable of receiving full trains, that is to say, trains of twenty-four cars, these tunnels have been removed and stone abutments erected, upon which are placed an iron trestle-work supporting the floorway of the bridge, which consists of three grand passages, and serves for the crossing of *les rues* de Madrid, de Berlin, de Constantinople, de Londres, de Vienne et de Saint Petersbourg. The bridge spreads out at each end in a fan-like form, but is wide enough at the center or between the two central abutments not only to give abundant room for the passage of the numerous vehicles which have occasion to cross it from the several converging streets, but to allow of the establishment of two circular open spaces for foot passengers similar to those found in several of the most frequented localities of Paris.

Instead of a trestle bridge, one of great arches of stone would have been preferred on the ground of more economical



BRIDGE CONSTRUCTED AT THE PLACE DE L'EUROPE IN PARIS.

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construction and more imposing, or,as the French term it, more *monumental* appearance; but this preference could not be gratified ,for the reason that the lowering of the *Place de l'Europe* had not left the hight at which the bridge must be constructed, sufficient with such a structure for the passage underneath of the engines and cars.

The depot forms a junction for seven railroad lines, and receives on the average over two hundred trains per day. On Sundays and *fête* days the number of trains frequently rises to over four hundred.

A feature of the bridge is its adornment at the ends with miniature gardens, a thing which will seem superfluous to the utilitarian minds of most Americans, but which to a Parisian is an appropriate and tasteful decoration.

Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

First Attempt to Make Oxygen Gas.

MESSRS. EDITORS:—Having seen it frequently stated that it is an easy thing to make oxygen. Three of us boys who are at school in the town of ———, Connecticut, decided to try the experiment. We saved of our weekly allowance of spending money until we had enough to set up in business under the firm name of Acid, Base & Salt. Acid is a sharp fellow, and to him was intrusted the duty of making the necessary purchases for the firm. He went down town and bought some bottles, some manganese, some chlorate of potash, and a piece of india-rubber tubing, and came home quite triumphant.

We soon rigged a stand for heating the bottles, bored holes through some corks that had been smuggled into the school, with bottles attached, by some of the larger boys, put on the tubing, and hung it into a pail of water which we had converted into a pneumatic trough, and everything being properly adjusted, the signal was given by Salt to fire up.

Breathless excitement, wonder if the thing would blow up; fiz, smoke, bottle cracks, bad smell—end of experiment one.

Observations in note book—"Mistake of text-book, oxygen gas has a decided odor." The failure of the first experiment was attributed to Acid's ignorant purchase of a common glass bottle instead of the Florence flask mentioned in the books, and Base agreed to try his luck. He brought a green bottle, and we thought this a good omen, as it was a capital likeness of ourselves—verdant people always want sympathy. The green bottle was soon filled with the black mixture, and we again fired up. This time the stopper flew out and scattered powder up to the ceiling and into our faces, and Salt lost the use of his eyes for several days. We resolved to abandon what the teacher called inorganic chemistry for the present, and try our hand at the manufacture of organic compounds, such as nicotine.

In this department we are happy to say that we met with eminent success, and had no difficulty in inducing neighboring boys to assist at the experiments. Our success in organic work gave us considerable courage, and we resolved to make another trial of oxygen. This time we made use of a small covered tin pail. It is hardly necessary to remark that the pail soon leaked, and an ugly semi-fluid mass ran out on to the stove, and confirmed our previous notions about the bad smell of oxygen.

The firm then went in a body to wait on a traveling photographer who lived in a big van on the village green, and he generously sold us a broken retort for two dollars. Armed with this, we made another attack upon the manganese and chlorate, and this time had the satisfaction of seeing a few bubbles of air collect in a jar over the water. This we carefully treasured for future experiment, and then wound up that day's work with a little additional manufacture of nicotine.

The first holiday afternoon the small boys of the school were invited to witness experiments with oxygen. A piece of phosphorus was procured and lighted with a match, and plunged into the jar—result, a brilliant light, a puff of smoke, strong smell of phosphorus, a loud explosion, and a heavy invoice of broken glass.

This was as far as we got with the experimental illustration of the properties of oxygen, and as soon as the smoke was cleared up, and the small boys had disappeared through the windows, it was resolved to settle up accounts and see how we stood previous to a dissociation of the association and a consequent liquidation of the firm.

The following is a copy of the balance sheet:

Acid, Base, & Salt in account with Chemistry:

	Dr.		Cr.
To 1 retort	$2.00	By 4 quarts oxygen	$0.04
" 2 bottles	0.50	" tickets sold to small boys	0.10
" 1 green bottle	0.25		$0.14
" 1 tin pail	0.50		
" Repairs of ceiling	1.00		
" Manganese, etc.	0.60		
" Rubber tubing	0.50		
" Cleaning stove	0.20		
	$5.55		
Balance to A. B. & S. debit			$5.41

Respectfully yours,

ACID, BASE & SALT.

P.S.—We are willing to part with our retort at half price.

A., B. & S.

Curious Associations Among Animals.

MESSRS EDITORS:—You willing, under the head of "Curious Associations of Animals," I will offer an instance or two. The first was of a young gray squirrel, captured to make a pet of, and brought home and put down on the ground near a house. In the twinkling of an eye an old cat emerged from under the floor, where she had young kittens, stole the pet, and returned under the floor, where there was no access; in fact, from her looks and peculiar growl, no one thought it worth while to attempt the recovery of the squirrel. But the surprise was some two weeks afterward, when on a fine sunny morning she brought out her little family to play, and lo! one had a bushy tail. She was very partial to it in attention, allowing it to suckle when she would not her kittens. The following spring the same cat, with kittens as before, had young rabbits given to her, and the kittens killed, unknown to her. On examination each morning there would be one less; on the fourth morning she was found devouring one, and she suckled them the same, and to all appearance thought as much of them as if they were her kittens, but ate them all up.

JOHN MITCHELL.

Cleveland, Tenn.

Scraped Surfaces.

MESSRS. EDITORS:—I would like to have a few words to say in regard to scraping as practiced in machine shops.

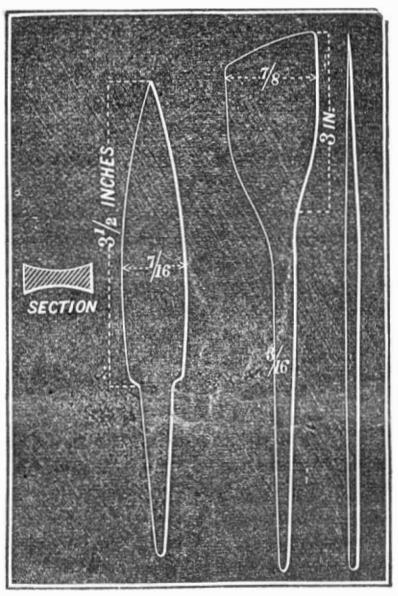
The subject has been opened in your columns. I would not have it stop just where it is, for the matter is very important to machinists generally.

Mr. Wm. P. Cowan knows something about scraping. His observations are correct in regard to valves; it insures a good surface for valves to start with. Whoever has had much to do with steam engines is aware how important it is to have some joints iron and iron in absolute contact, to stay the wasting away of important parts.

I have practiced scraping more generally than I know of others doing for the last twenty years, and I have to say the practice will discontinue the use of fine-cut files used in finishing; to me it is painful to see a man wasting time in trying to finish a piece of work with a fine file worked with oil. I will do his work better with a scraper in one fourth the time.

I know some experienced workmen will object to my statements, which I will prove true to any one who may test them. I scrape cast steel as well as other metals.

To make a good scraper, an extra piece of steel must be



used, as it will scratch; and it should be very carefully forged, plated out very thin, and tempered as high as can be used without breaking.

The above sketch will show forms which can be used most generally. I never could use a three-cornered scraper, except on lead and the like.

I. E. BARBER.

Norwich, Conn.

The Sun-flower as a Prophylactic.

MESSRS. EDITORS:—I noticed an editorial in your paper ridiculing the idea of the sunflower having any influence in purifying malarious air, and you were no doubt right so far as regards the manner in which it was then supposed—by some ignorant philosopher cited—to act, namely, by absorbing deleterious, and giving off healthful, gases.

In the SCIENTIFIC AMERICAN of May 21, page 335, you speak of the benefits of Professor Tyndall's discovery: that malaria may be *strained* out of the air we breathe, it being nothing more or less than germs or sporules floating therein, which enter into our circulation, and either by growing into multiplied numbers clog up the pores of the system or act as direct poisons on the blood.

Now if you were living in a shanty on a Mississippi bottom, and wished to strain all the air coming to it from the swamps around, can you think of any more effectual device for that purpose than a thick grove of tall sunflowers planted on every side? The leaves of this plant are the "perfection of nature" as adapted to this purpose; large, on long petioles which allow them to wave in the breeze, thickly set on the stalk, covered on both sides with minute hairy hooks that catch every little impinging particle, and also viscid to the touch—what more perfect machine could be invented for the purpose desired? I think that a breeze could hardly get through a rod thick of sunflowers without every particle of it having come in contact with the surfaces of the leaves. Planted at the proper season, they attain their best growth for the purpose just at the time when malaria is most prevalent, and are of more certain growth in a rich malarious soil than any other cultivated plant within my knowledge. If this vegetable only produced fruit like the banana, it would be the glory of the middle zones.

Speaking of this matter reminds me that as a general rule those household plants which have a reputation for being "healthy" are all of this character—rough-leaved, like the geranium, for instance, while the glabrous-leaved plants, like live-forever, are said to be unhealthy.

This is not the first example in which the "old woman philosophy" has outstripped the advance of science, nor in which a strong popular faith, based on observation, has proved to be the forerunner of valuable discovery.

Memphis, Tenn. CHAS. BOYNTON.

Curious Electric Phenomenon.

MESSRS. EDITORS:—In No. 22 of the present volume of the SCIENTIFIC AMERICAN my attention was directed to a communication on a "Curious Electrical Phenomenon." I have observed, in testing the American oil feeders in an hydrometer glass, as the oil dropped from the end of the feeder into the glass vessel below, that by rubbing the glass vessel on the outside with dry papers so as to produce friction, the oil will fly off at right angles, or in a horizontal line, from the point of the feeder direct to the inside of the glass vessel in small streams fine as the strands of a spider's web. I use this method to test the electrical condition of the atmosphere, and have noticed that if a thunder-storm is likely to occur throughout the day or night, or if the weather is warm and humid, it will show that the electric condition of the atmosphere is deficient in the locality. If the experiment is made and it fails to act as above stated—showing that clouds draw the electricity in the direction of the storm or the winds that carry it—will this not account for the phenomenon produced by the running belt referred to?

By standing under a large belt which is running at a fast speed, a very singular sensation is produced—it makes the hair of one's head feel as if it were crawling, or about lifting a person off his feet.

T. B. WICKERSHAM.

Philadelphia, Pa.

MESSRS. EDITORS:—In your issue of May 28th, I observed a communication over the signature of Sereno S. Lukens, of a very curious electrical phenomenon.

This same phenomenon came under my notice a few weeks since, and I observed that after a few moments the oil ceases to flow from the can.

The explanation which first presented itself to me was that the air became rarefied about the oil can, consequently the air contained in the can, being at a greater pressure, forced the oil out.

I also observed that the hand held near the belt diminishes the flow of oil. The reason of this I assign to the breaking up of this vacuum by the hand coming in contact with the currents of air which produces this partial vacuum.

Hopkinton, Mass. A. GLEASON.

First Artificial Fire.

MESSRS. EDITORS:—An article on page 316, present volume, on "The First Artificial Fire," leads me to say that I have seen the experiment of producing fire from two sticks a success, the method being as follows: A bed piece an inch thick, notched in $\frac{1}{4}$ to $\frac{3}{8}$ of an inch on one edge, and the other piece a smooth, round stick, 12 or 15 inches long, from $\frac{1}{4}$ to $\frac{3}{8}$ of an inch in diameter. A drill hole above the notch is started so that the powder produced will fall out of the notch.

In this experiment a knife blade was put under to catch the powder. The stick used as a drill was moved rapidly with the hands both ways, in the manner of a drill, commencing at the top until the pressure brought the hands to the bed piece, when they were shifted to the top again. The blackened, charred dust rolled out from the notch and smoked. A few very light shavings were added, and with a light breath the thing was done.

In the tropics some kinds of wood are sharper grained than here, and as dry as perhaps can only be made here by baking. That it can be done I have seen, but those with tender hands had better not attempt it, for blisters will surely be the result.

There is some experience needed after the dust is ignited. Dr. Collas or any other learned gentleman cannot argue away a fact.

A. G. WILLEY.

Murfreesboro, Tenn.

Wear of Front Wheels on Locomotives.

MESSRS. EDITORS:—In reply to the question "Why do the fore wheels of locomotives wear more than the hind ones?" I would suggest the constant jarring or thumping to which they are subjected. It is well known that the fore wheels of locomotives do not hug the track, but advance by a series of jumps, caused by the jerk of the piston rod at the commencement of each stroke. This being communicated to the driving wheel seeks the point of least resistance, which is upward. With long and heavy trains the jarring becomes a source of great annoyance to engineers.

Jersey City, N. J. F. P. DODGE.

How to Kill Currant Worms.

MESSRS. EDITORS:—On page 332 of present volume of your paper appears a communication, signed J. H. P., giving a description of the currant worm, and his manner of destroying them, which requires considerable time and patience. If J. H. P. will try the following plan, I think he will throw away his tin pan, or use it for some other purpose. Keep watch of the bushes, and as soon as you find the eggs all hatched and the worms fairly at work, dust the bushes thoroughly when wet with dew or rain with powdered hellebore, using for the purpose a common flour dredging box or pepper box. That will be the end of that brood of worms. Should another brood appear in the course of the season, repeat the operation. It has been an infallible preventive with me for five years.

Rochester, N. Y. A. G. B.

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[For the Scientific American.]

A CHAPTER ON COCKROACHES.

BY JOHN R. GORDON.

There is a tribe of very disagreeable little individuals of a class of insects belonging to the order *Orthoptera*, to which is given the appellation cockroaches. These abominable creatures abound in the West Indies. They are of the tribe called *Blatta*. Several species are found, the most common, however, being the *Blatta gigantea*, and *B. Americana*. The *B. gigantea* is termed by the natives, the drummer cockroach; and the *B. Americana*, the common cockroach. The former makes a most remarkable noise when excluded from light. This noise is similar to that caused by a person rapping on any sonorous object with the fingers, hence its cognomen of drummer.

The drummer is considerably larger than the common cockroach, it being about two inches, while the latter is only about an inch and a half in length. The former has a skin of a dusky brown color, sometimes inclining to an olive tinge, and the latter is of a chestnut color, inclining to red. The antennæ of the common cockroach are more delicately formed than those of the drummer. Both of these species exclude themselves from the light when they can, and prefer the abode of man for the place of their habitation, hence they are found secreted behind all objects of household virtu which are not frequently removed. When roused they emit a very disagreeable odor, not unlike that arising from asafœtida. They are predaceous, and are very destructive, eating almost anything that comes in their way—apparel, provender, all household articles that can be gnawed by their delicate mouths; and even men's fingers and toes do they nibble. Like most others, they have wings, which are mostly employed at night. They may be heard whizzing over one's head in their nocturnal gyrations, particularly during the rainy reasons, which seem to be propitious to their peregrinations.

The earth is not their element, for there are too many enemies to be met with there, principally in the poultry yard. Woe betide the poor roach who setteth foot within the domains of Chanticleer, he is not sooner there than he is gulped down by some greedy denizen of the hen coop.

Cockroaches increase very rapidly, and gather in such clusters that they necessitate frequent cleaning of the habitations of mankind; and it is a source of amusement to the native children at such times to get hold of some fowl, tie a string to its foot by which to hold it, and set it to catch these insects.

Besides being offensive in their predaceousness, they are very objectionable on account of the filth which they deposit in their track. The cockroach brings forth its young by eggs, which it deposits all about. The eggs are inclosed in a horny case, which is generally placed within the angles of any regular-sided object. The case is attached by means of a sort of glutinous matter, which holds it so firmly that if an attempt be made to detach it, the case will be frequently broken before it can be separated from the place where it is fastened.

One night I heard a peculiar grating noise in my bed room. Desirous to ascertain the cause, I jumped up and struck a light, when, to my disgust, I saw one of these creatures gnawing away at my sperm candle. He had actually climbed up the side of a highly polished china candlestick, and was as busy as could be satisfying his appetite. Selecting a good stout pin and a piece of pine board, I killed and pinned him to the board, laid him aside till next day, and took his portrait, which I added to my collection of others I had taken.

I have occasionally heard strangers remark, when rising of a morning, that they could not think what was the matter with the tips of their fingers, they were so sore, little imagining that these greedy things were the sole cause, and being informed, they would hardly believe the assertion that the cockroaches had done the mischief.

Various means are adopted for destroying cockroaches, but there are none so effective as the broom, fire, and fowls for exterminating them.

The common house spider is great enemy to the roach, but it very often finds its match when it meets in combat with some tough-skinned *Blatta Americana*. Although the *B. gigantea* is so much larger than the former, it is not so formidable, as its skin is less hard, and therefore more liable to injury

I have often stood and watched a combat between a cockroach and a spider. Upon a certain occasion one of these flew right into the web of a huge spider. He watched it for a while, then advanced and placed a foot upon it. The roach immediately turned round and charged at him, turning him over; but, by so doing, it became entangled in the spider's web, which the spider perceiving, made haste to take advantage of the opportunity, and, springing upon the inverted roach, sank his fangs into its stomach. After having accomplished this feat, he bore it off to the center of the web, there to terminate its sufferings by sucking it to death.

Beneath a spider's web may frequently be seen the skins of some unfortunates who have perished in this way.

It would be thought that the formidable sting of the *Apis mellifica*, or honey bee, would deter the cockroach from going into its hive, but by some means or other these bugs manage to gain admission to a place to which not many other insects have entrance. Often, in cleaning my hives, have I discovered these demon-like creatures secreted therein, although not in great numbers, for they would then be detected and expelled by the revengeful bees.

I suppose that the honey was the cause of their congregating in the hives. I did not much like these incursions on my bees, and being informed that corn meal saturated with laudanum placed where the roaches could eat it, would destroy them. I tried it, but it was useless. To introduce a fowl to the realms of the queen bee would be disastrous, so I had no other alternative but to sweep them out and exterminate them.

It is impossible to keep cockroaches out of any piece of furniture, unless it be made very tight. Book cases, chiffonniers, escritoires are all infested. Even pianos are not free from their inroads. The backs of upright pianos are generally covered with a light quality of merino, or something of the kind, when purchased. They eat through this and enter the instrument, doing it considerable injury. I had recourse to insect powder, but found it useless, and after trying various dodges to put a stop to the incursions of these voracious things, I bought some wire gauze and placed it on the back of my piano, and likewise beneath the silk of the front; I also made a pedal box to prevent entrance through the apertures below the pedals.

The name of the drummer roach in the Creole patois is, Tucko-tucko, applied to it as characteristic of the noise which it makes. The common roach is termed, Cacka-lacka. Whence this term, I know not.

The noise occasioned by the drummer cockroach is considered by persons who incline to superstition, as token of the death of some acquaintance of those who happen to hear it, and it is held in almost the same awe as is the insect known in northern countries as the death watch—*Atropos pulsatorius*.

The cockroach has ascribed to it by the negroes, medicinal qualities; and, indeed, if an asthmatic person should turn up his nose on finding one of these disgusting creatures in his cup of tea or coffee, he is very coolly informed by his servant who is standing awaiting his call that it will no harm, it is good for the asthma.

The Croton, or water bugs, which resort to American kitchens, bear a strong resemblance to a small roach called the Spanish cockroach in the West Indies. It is of the same size, shape, and color. These are not so numerous as the *Blatta Americana*, nor are they so destructive.

For the Scientific American.

BALLOON VARNISHES.

BY JOHN WISE.

There are two ways of preparing linseed oil for balloon varnish. The quick and the slow process. The first is by heating the oil up to a temperature at which it will ignite spontaneously. In order to secure it from burning up it must be heated in an iron or copper vessel, with a lid that can be closed when it begins to emit dense white vapor. If it is desired to have it fast drying, from four to six ounces of litharge per gallon should be boiled in it. This process takes about one hour, and renders the oil thick and tough, giving a good body and glossy surface to the cloth.

The slow process is to boil the oil from twelve to twenty hours, keeping it at a temperature of about 200° Fah., incorporating with it while boiling half an ounce of sulphate of manganese to each gallon of oil. These varnishes shou'd be applied to the cloth tolerably hot.

There are other formularies, such as the incorporation with the oil of some bird-lime, a gelatinous substance made from the inner bark of the white holly. Gum elastic is also used to give the oil body and elasticity. When I desire to make a balloon extraordinarily close, I give it a first coating of compound varnish, made of equal parts of white glue and glycerin.

I filled a balloon last October on the "Union Fair Ground," of Orrville, Ohio, with pure hydrogen, on Wednesday, and ascended with it on Friday following, after it had stood rain and wind, and sailed over a hundred miles with it. This balloon was varnished with the slow process oil, over a first slight dressing of glycerin and glue.

Coal gas, or technically, carbureted hydrogen, does not *exosmose* from the balloon nearly so fast as pure hydrogen. By coating a balloon heavily with either of the above varnishes, it will retain its buoyancy with a loss of about one per cent in twenty-four hours, provided it has a capacity of 30,000 cubic feet. When larger, the *exosmose* is comparatively less; when smaller, comparatively greater, owing, of course, to the disparity of cubic contents to surface.

[For the Scientific American.]

SCIENTIFIC PERIODICALS FOUND IN NEW YORK LIBRARIES.

BY H. CARRINGTON BOLTON.

The following list of the principal scientific journals found in the libraries of this city was compiled for private use, but may prove of value to the readers of the SCIENTIFIC AMERICAN. It by no means pretends to be a *complete* catalogue of periodicals in *all* our libraries, but comprises those most useful for reference in the five libraries mentioned, especially journals relating to chemistry, physics, technology, and natural history.

The abbreviations used are as follows:

A.—Astor Library.
L.—Lyceum of Natural History.
M.—Mercantile Library.
S.—Society Library.
SM.—School of Mines, Columbia College.

When a letter is inclosed in brackets, the sets of journals in the library indicated are not complete.

AMERICAN AND BRITISH.

American Journal of Science (Silliman). 1818-70.....A. SM. [L.] S. M.
Annals of Electricity, Magnetism, etc. (Sturgeon 1836-43..A.]
Annals and Magazine of Natural History (See Magazine idem). 1838-70.....A.
Annals of N. Y. Lyceum of Natural History. 1824-70.....A. L. SM.
Annals of Philosophy. 1813-26.....A.
Annals of Scientific Discovery. 1850-70.....SM.
Chemical Gazette. 1842-59.....SM.
Chemical News. 1860-70.....SM. A.
Dublin Quarterly Journal of Science. 1861-70.....A.
Edinburgh Journal of Science (Brewster). 1824-32.....A.
Edinburgh Philosophical Journal. 1819-70.....A.
Geological Magazine. 1864-70.....A. [SM.]
Journal of Chemical Society (London). 1849-70.....SM.
Journal of the Franklin Institute. 1826-70.....A.[S.] [SM.] [M.]
Journal of Natural Philosophy (Nicholson). 1797-1813.....A.
Journal of Philadelphia Academy of Sciences. 1847-70.....A.
Journal of the Photographic Society. 1854-70.....A.
Journal of Microscopical Science. 1853-70.....A.
London Journal of Arts and Sciences. 1820-70.....A.
Magazine of Natural History (See Annals idem). 1829-36...A.
Mechanics' Magazine. 1823-70.....A.
Mining Magazine (N. Y.) 1853-58.....A. SM.
Mining and Smelting Magazine. 1862-70.....A. SM.
Patent Specifications of Great Britain. 1622-1870.....A.
Patent Reports, U. S.....A.
Pharmaceutical Journal and Transactions (Bell). 1841-70.A.
Philosophical Magazine. 1793-1870.....A. [SM.]
Philosophical Transactions. 1665-1870.....A. S.
Proceedings of Chemical Society (See Journal idem). 1841-48.....SM.
Proceedings of Philadelphia Academy of Sciences. 1841-70.A.
Quarterly Journal of Science (Brandes). 1816-31.....A.
Records of General Science (Thomson). 1835-36.....M.
Report of the British Association for Advancement of Science. 1831-70.....A. SM.
Report of the American Association for Advancement of Science. 1848-70.....A. SM.
Repertory of Arts and Manufactures. 1794-1834.....A. S.
Repertory of Patent Inventions. 1835-70.....A. S.
SCIENTIFIC AMERICAN. 1845-70.....A. SM.
Yearbook of Facts. 1839-70.....SM.

FRENCH.

Annales des Arts et Manufactures. 1800-17.....A.
Annales de Chimie (et de Physique). 1789-1870.....A. [S.] SM. [M.]
Annales des Mines (See Journal idem). 1816-70.....A. [SM.]
Annales du Musée d'Histoire Naturelle. 1802-70.....A.
Annales du Génie Civil.....A. [SM.]
Annales des Sciences Naturelles. 1824-70.....A.
Annuaire de Chimie (Millon et Reiset). 1845-51.....A.
Archives des Découvertes. 1809-39.....A. S.
Bulletin du Musée de l'Inaustrie de Bruxelles. 1842.....A.
Bulletin de l'Industrie Minerale. 1855-70.....SM.
Bulletin de la Société Chimique de Paris. 1864-70.....A. [SM.]
Bulletin de la Société Géologique de France. 1830-70.....A. [SM.]
Bulletin de la Société d'Encouragement. 1802-70.....A.
Bulletin Universelle, 2eme Section, Géologie. 1824-31.....A.
Compte Rendu de l'Académie des Sciences. 1835-70.....A. [SM.]
Cosmos (Moigno). 1852-70.....A.
Journal de l'Ecole Polytechnique. 1794-1870.....A.
Journal des Mines (See Annales idem). 1797-1815.....A.
Journal de Physique (Rozier). 1771-1832.....A. L.
Journal de Pharmacie. 1815-1870.....A.
Mémoires de l'Académie des Sciences de Paris. 1666-1870.A.
Repertoire de Chimie pur. 1859-63.....A.
Repertoire de Chimie Appliquée. 1859-63.....A.
Revue des Cours Scientifiques. 1863-70.....A. [SM.]
Revue Universelles des Mines. 1857-70.....SM.
Technologiste. 1840-70.....A.

GERMAN.

Allgemeines Journal der Chemie (Scherer). 1798-1803.....A.
Allgemeines Journal der Chemie (Gehlen). 1803-10.....A.
Allgemeine Nordische Annalen der Chemie (St. P.) 1819-23.....A.
Annalen der Chemie und Pharmacie. 1832-70.....A. SM.
Annalen der Physik (Gilbert). 1799-1823.....A. SM.
Annalen der Physik (Poggendorff). 1824-70.....A. SM.
Archiv für Microscopische Anatomie (Schultze). 1835-70.SM.
Archiv für Naturgeschichte (Erichsson). 1835-70.....A.
Archiv für Berg. und Hüttenwesen (Karsten). 1818-31....A. SM.
Archiv für Mineralogie, etc. (Karsten). 1829-55.....A.
Archiv für gesammten Naturwissenschaften. 1824-.....A.
Bergwerk's Freunde. 1839-56.....SM.
Berg. und Hüttenmännische Zeitung (Hartmann). 1842-70.SM.
Bericht über Fortschritte Eisenhütten-Technik. 1864-70..SM.
Bericht Deutsche Chem. Gesell. Berlin. 1868-70.....SM.
Bericht Mittheil. Naturw. (Haidinger). 1846-51.....SM.
Chemisch-Technisch Mittheilungen (Elsner). 1846-70.....SM.
Fortschritte der Physik. 1845-58.....A.
Gesellschaft Naturforsch. Freunde zu Berlin; Beschäftigungen, Schriften, Magazin, Verhandl. der. 1775-1819.A.
Jahrbuch für Berg. und Hüttenwesen (Moll). 1797-1809...A.
Jahresbericht der Chemie (Berzelius). 1822-51.....SM. A.
Jahresbericht der Chemie (Kopp und Will). 1847-70.....SM. A.
Jahresbericht der Chem. Technologie (Wagner). 1855-70.A. SM.
Jahresbericht der Agricult. Chemie. 1858-70.....A.
Jahrbuch der K. K. Geolog. Reichsanstalt Wien. 1850-67..SM.
Jahrbuch f. Mineralogie und Geologie Leonhard. 1829-70..A. [SM.]
Journal der Physik (Gren). 1790-98.....SM. A.
Journal für Chemie und Physik (Schweigger). 1811-27....A.
Journal für Techn. und Œkonom. Chemie. 1828-33.....A.
Journal fur prakt. Chemie (Erdmann). 1834-70.....A. [SM.]
Keferstein's Deutschland (Geologie). 1821-31.....A.
Kalender für Berg. und Hüttenmänner. 1827-70.....SM.
Magazin f. Bergbaukunde (Lempe). 1785-96.....A.
Oestreich. Zeitschrift f. Berg. H. und Salinenw. 1854-70...SM.
Oryktographie von Sachsen. 1828-48.....SM.
Pharmaceut. und Chem. Centralblatt. 1830-70.....A. SM.
Polytechnisches Centralblatt. 1835-70.....A. [SM.]
Polytechnisches Journal (Dingler). 1820-70.....A. [M.] SM.
Repertorium der Physik (Dove und Moser). 1837-49.....A.
Taschenbuch f. gesammt. Mineralogie (Leonhard). 1807-1824.....A.
Verhandlung. Mineralog. Gesellschaft (St. Petersburg.) 1842.....A.
Zeitschrift f. analyt. Chemie (Fresenius). 1862-70.....A. SM
Zeitschrift f. Chemie. 1858-70.....[SM.]
Zeitschrift f. Physik und Mathem. (Baumgartner). 1826-.
Zeitschrift d. Verein. Deutsch. Ingenieure.....[SM.]
Zeitschrift f. Mineralogie (Leonhard). 1824-29.....A.

Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

1,022.—MEANS FOR BINDING MUSIC, PAMPHLETS, ETC.—A. M. Crowhurst Boston, Mass. April 13, 1870.

1,163.—STOVES OR FURNACES.—M. C. Hull, New York city. April 21, 1870.

1,170.—MOWING AND REAPING MACHINES.—R. Eickemeyer, Yonkers, N.Y. April 22, 1870.

1,219.—PROCESS FOR CLEANING WOOL AND HAIR.—C. F. A. Simonin Philadelphia, Pa., and E. W. Coffin, Glendale, N. J. April 27, 1870.

1,226.—APPARATUS FOR STARTING TREADLE MOTIONS, APPLICABLE TO SEWING MACHINES, ETC.—O. H. Needham and C. N. Brainerd, New York city. April 28, 1870.

1,225.—MECHANISM FOR TRANSMITTING MOTION.—R. B. Hand and J. B. Holden, Jersey City, N. J. April 28, 1870.

1,227.—PIPE WRENCH.—D. C. Stillson, Charlestown, Mass. April 28, 1870.

1,252.—STOP COCK.—J. C. Chapman, Cambridgeport, Mass. May 2, 1870.

1,270.—TRACTION FOR LOCOMOTIVE ENGINES.—J. K. Lake, Chicago, Ill, May 3, 1870.

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Keables' Improved Sewing Machine.

Of all the labor-saving machines produced during the last half century, none has worked a greater revolution in the arts than the sewing machine. Its influence is directly or indirectly felt in almost every branch of the mechanic arts, and it has opened up new avenues for the employment of millions of operatives.

We never witness the operation of one of these useful little workers, without a feeling of admiration and pleasure, and we confess to a real delight in personally putting them through their various movements, and watching them as they rain stitches upon the texture they are designed to sew.

It is, therefore, a pleasant task we perform in presenting to our readers an illustrated description of a new member of this now large family of labor savers. The machine under consideration is a single thread machine, its principal and most important feature being the looper hook, which is constructed in a novel manner.

The needle bar has a parallel vertical motion, imparted to it by a crank and slotted cross-head, the crank wheel shaft being driven by a gear and pinion. The feed motion is obtained by a small eccentric on the crank wheel shaft connected with a rock-shaft underneath the table of the machine by a connecting rod.

The looper hook upon which the interest of the invention chiefly centers is shown in detail at the left of the engraving, and also at A, in the principal engraving, in which latter it is shown in conjunction with the point of the needle.

The swinging arm, A, in the detail which carries the hook, B, has a slot in which a part of the hook commonly rigidly connected to the arm, is pivoted at C, and a spring, D, is introduced between the end of the hook projecting rearward of the pivot and the bottom of the slot, to support the said rear end at the required point to maintain the point of the hook in the true position, and to yield and allow the working thread to draw the point upward, at the time the loop is escaping, and at the moment the point moves back to the needle to facilitate and insure the escape of the loop.

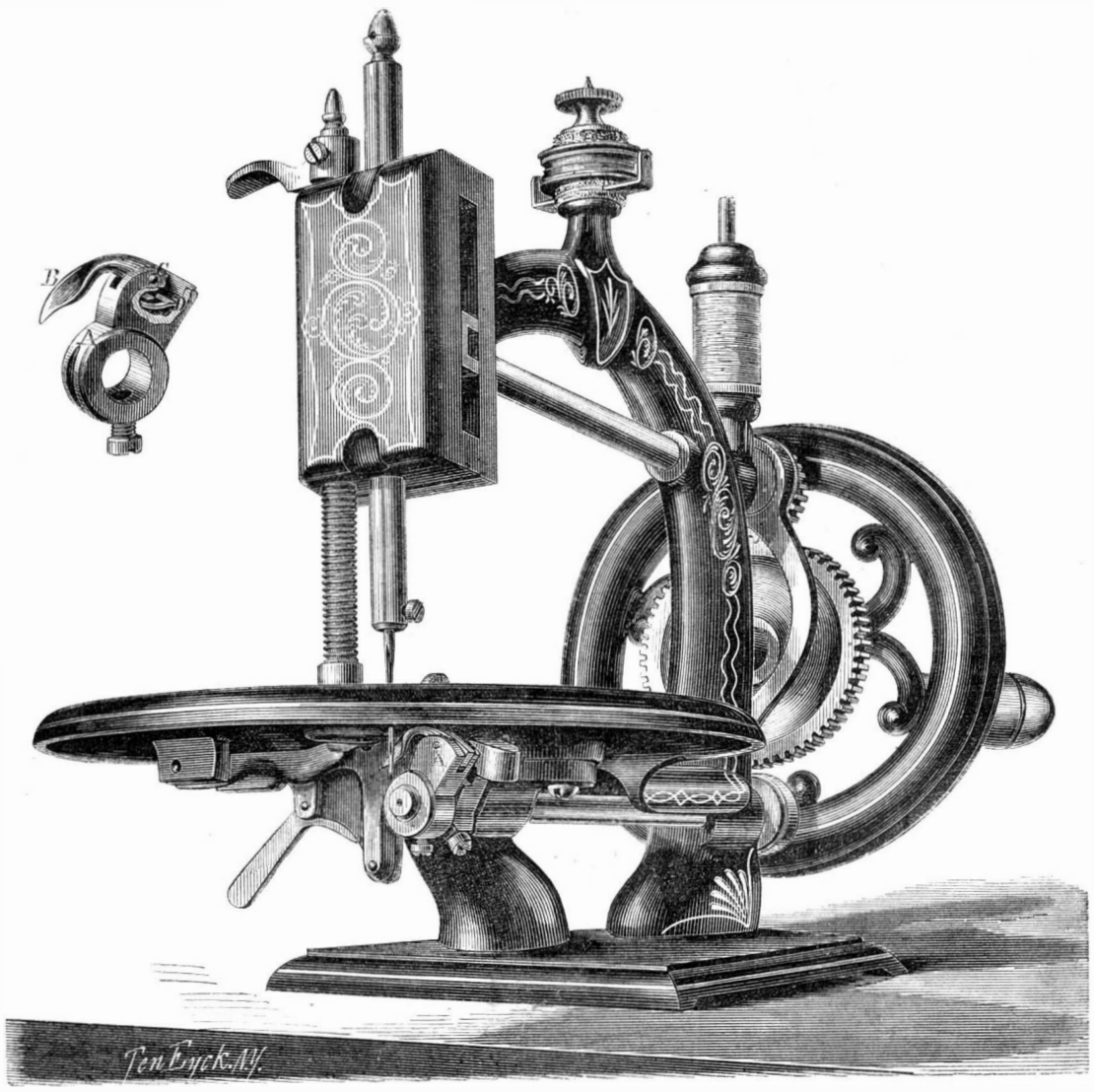
Any suitable stop may be provided to prevent the spring from forcing the point of the hook down too low.

The spring may be attached in a different way, for instance, it may be attached to the arm at the bottom of the slot, and connected to the hook at the front of the pivot, so as to draw it downward thereat, or a spiral spring may be substituted for it and placed either side of the pivot, in the one case forcing upward, and in the other pulling downward. The arrangement first described is however preferred.

It is claimed that the following advantages have been demonstrated for this form of construction by ample tests, and that those who have tried the machine are unanimous in their indorsement of the value of the improvement. We will add our own opinion, based on a personal trial of the machine, that the advantages claimed are secured.

The hook being elastic it is less liable than others to break thread, allows the drawing up of the stitch more regularly and perfectly, obviates the possiblity of catching the loop a second time, and therefore prevents tangling or leaving loose open loops on the under side of the seam. In a word it surmounts difficulties that have hitherto been considered insurmountable, and enables it to do perfect sewing with any kind of thread or any description of goods. It is easily managed and adjusted, running from one to many thicknesses of goods, or over any irregularity of seams or otherwise, perfectly without change of tension.

Patented, through the Scientific American Patent Agency, May 17th, 1870, by Michael Ash Keables, of Brattleboro', Vt. For further information address Keables, Osborn & Co., Guelph, Ontario county, Canada West.

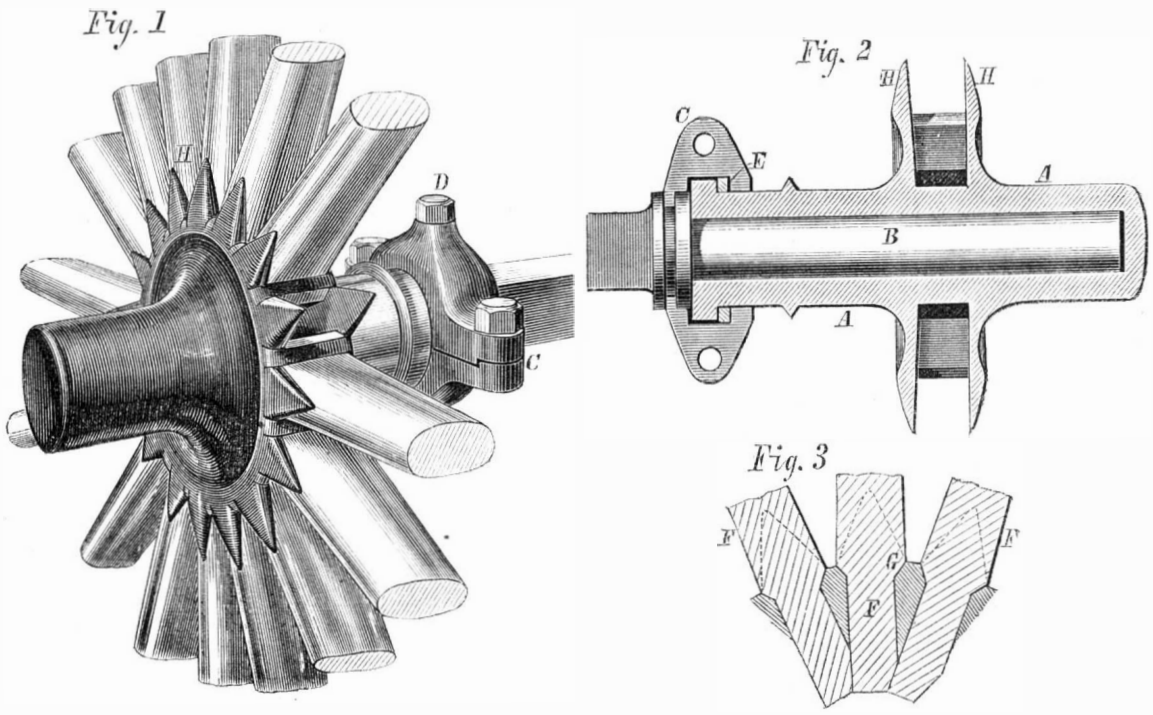


KEABLES, OSBORN & CO'S SEWING MACHINE.

Improved Wagon Wheel.

Among some of the most interesting and practical inventions we have of late been called upon to illustrate and describe are those pertaining to draft vehicles. We this week present still another, which we regard as combining the essentials of a good wheel in a high degree. It is light, strong, and graceful in appearance, while it also provides for convenient and constant lubrication, and the exclusion of dust from the journals of the axle.

The improved construction is confined principally to the central part of the wheel, and Fig. 1 is a perspective view of so much of a wheel as is necessary for purposes of description; Fig. 2 being a sectional view of the same, and Fig. 3 a detail, showing more particularly the method of inserting the spokes.



ADAMS' IMPROVED CARRIAGE WHEEL.

The hub, A, is of metal, and has the form shown in Figs. 1 and 2. The journal of the axle, B, Fig. 2, has two collars formed at the part where it joins the body of the axle, and the hub, A, has also a collar formed upon its inner end. A clutch C, Figs. 1 and 2, clasps both the collar on the hub and one of the collars on the axle, thus preventing the wheel from slipping off. An oil cup, D, formed in the top of this clutch, and provided with a suitable plug, serves as a reservoir for lubricators, securing not only economy, but convenience in oiling. The spokes are inserted, as shown in Figs. 1 and 3, the tenons being shown at F, Fig. 3. The shoulders, G, are beveled, as shown, so that the spoke has two points of support where it meets the hub, and one at the bottom of the mortise. They rest against each other at the bottom, as shown, and are supported latterly by radial projections, H, Figs. 1 and 2, which branch from the body of the hub, and which give great lateral strength to the wheel when subjected to side strains.

The hub can be made very light for light carriages, and when plated or handsomely painted, is quite ornamental in appearance.

The invention is covered by two patents, obtained, through the Scientific American Patent Agency, by Levi Adams. They are respectively dated February 18 and March 31, 1868.

For further information address J. Adams & Sons, manufacturers of wagons, carts, and wheels, Amherst, Mass.

Wanted--Better Artificial Lights.

Civilization, says the *Christian Union*, often brings in necessities, which art is backward in properly providing for. A good artificial light for common use is still to be sought, the myriad advertisements of eurekas which promise to perfectly replace the sun in its absence to the contrary notwithstanding. A very large share of work, reading, studying, and writing, must be done after the sun has set, and the demand, on sanitary grounds, is for a light that will be bright, that will not flicker, that will not emit nauseous odors, and, finally, that will not keep the nerves in a continual state of tension for fear there will be an explosion and a conflagration, to say nothing of the direful results when such an accident does happen. In brightness of indoor illumination we have greatly advanced on our forefathers For cities, gas has long replaced candles, whale oil, and other materials, which now have but a sickly burning to our eyes, and more recently petroleum has been joyfully welcomed as a blessing where gas is not available, and travels all over the world to cheer dark places with its unrivaled brilliance.

For a general lighting up of buildings coal gas has much to commend it; for closer use, where the eyes are intently fixed upon any book or work, it is about as bad for these organs as anything that could be devised. The inevitable flickering, except where it is used in a very expensive manner, strains the nerves to the ruin of the eyes. As contrasted with gas, for those who have to task their eyes severely, kerosene is preeminently superior. It has a illuminating power beyond any known substance within the popular reach, is clear, white, and burns with perfect steadiness. In these regards nothing better could be devised, especially when the flame is properly shaded, and the light cast only on the work. But the introduction of kerosene has brought in a history of fearful destruction to life. Much of this has been due to most reckless carelessness, or wicked cupidity. Manufacturers, unrestrained by conscience or law, sell what they know to be explosive material of the worst kind, in place of what is harmless in this respect. People are so stupid or ignorant that they will fill burning lamps, or throw kerosene into the kitchen fire. Perhaps the number of such is overrated. Kerosene is in use everywhere through our vast population. Every accident by it, from Maine to Texas, is telegraphed by the Associated Press, and, perhaps, if comparisons were made, it would be found that disasters through its careless use are not so out of proportion to disasters from many other articles in common use as would seem

For illumination and for the safety of the eyesight it is by far the best material within reach of the public; and it is worth a great deal of pains to learn how to use it with safety. The glass lamp needs care to prevent breakage when lit, though in most cases the flame will be harmlessly extinguished by a fall; on the other hand, a metal lamp is more likely to heat, and raise gases from the surface of the oil.

The student's lamp is very near the ideal, only it requires more careful cleaning than most domestics bestow, and should be generally under the immediate care of master or mistress Some gentlemen consider it a nuisance to have anything to do with a lamp, but we like to see such enthusiasm for a good light as will lead a person to keep his lamp under his own charge, just as he does any other appurtenances of his study.

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To Advertisers.

The circulation of the SCIENTIFIC AMERICAN is from 25,000 to 30,000 copies per week larger than any other journal of the same class in the world. Indeed, there are but few papers whose weekly circulation equals that of the SCIENTIFIC AMERICAN, which establishes the fact now generally well known, that this journal is one of the very best advertising mediums in the country.

THE METROPOLITAN MUSEUM OF ART.

This institution was incorporated on the 13th of April, 1870, and has now been fully organized according to law, and is ready to enter into active operations. The great difficulty the corporators encounter at the outset is to prepare a plan that can be accepted by unanimous consent, as thoroughly practical. We have had so many futile schemes proposed during the last twenty years that the public has grown suspicious, and no one is willing to give money until all objections on the score of practicability have been removed. The high character and powerful influence of the gentlemen who have thus far taken part in the movement are the best guarantee of the sincerity of motive and determination to succeed, that the public could demand for the Metropolitan Museum.

What we now want is a well devised scheme that will strike everybody as feasible, and at once elicit general sympathy and practical aid.

The officers consist of such men as John Taylor Johnson, Wm. Cullen Bryant, John A. Dix, Robert Gordon, Wm. T. Blodgett, S. L. M. Barlow, Joseph H. Choate, John F. Kensett, Robert Hoe, Jr., Samuel G. Ward, W. J. Hoppin, J. Q. A. Ward, Geo. P. Putnam, C. E. Detmold, and other well known citizens.

In addition to the Art Museum we now hear of a somewhat analogous enterprise, called the American Exposition Company, with a capital on paper of $7,000,000, and we must not lose sight of the Historical Society, who have the great advantage of a site accorded to them in the Central Park by the Legislature. The American Institute, with its models, library, annual fairs, and interesting scientific meetings, also occupies some of the ground proposed to be covered by the Art Museum; and there is the Mechanics' Library Association, which ought not to be forgotten in this connection.

What we evidently want is a scheme that will unite all of these conflicting interests under one head, and thus insure the hearty co-operation of all who have thought upon the subject, and are earnestly engaged in the work.

The committee of the Metropolitan Museum of Art who have the matter in charge, will naturally refer to European models for illustration and for the suggestion of ideas; but after all, they must create something conforming to the wants of this country, and comprehensive enough to anticipate the great future that is before us. The new plan ought to be adapted to the genius of our institutions, and while it borrows from the past, it must not be unmindful of the present, nor fail to look at the future.

Let us discuss a few of the most famous existing models, and then see how they can be altered to suit American ideas. The Palace of Industry, in Paris, has many good features. It comprises a permanent exhibition of mechanical contrivances, and at stated periods the building can be used for art collections. In the details of its management are many features that can be copied with advantage by us. In Turin the Italian Government has founded a grand technological collection upon a comprehensive and well digested plan, from which we can borrow some good ideas.

All over Germany are art collections, historical museums, technological institutes, and schools for the training of pupils in all of the fine arts; and the field is very rich for any one who is in search of information. Lastly, we come to England, where the Kensington Museum and the Crystal Palace stand out prominently as the creations of modern times, and naturally appear to be within the reach of America.

Kensington Museum was first formed with special reference to ornamental manufactures and schools of design; but it has since been greatly expanded, and is now one of the most interesting and instructive places in the world. One peculiar feature of that museum can be copied to some extent in this country, and that is the loan collection. Many of our wealthy citizens possess rare works of art that they would be willing to loan to a responsible corporation, as has been abundantly proved by their generosity on the occasion of charitable fairs in this city. Many specimens they loaned would be apt to remain indefinitely, and they eventually become the property of the association. The question is, how can all of these models be worked up to suit our wants? It is not an easy problem to solve, and we can only approach the subject with such suggestions as occur to our minds, without attempting to pronounce a final decision upon it.

It is doubtful if an art museum, pure and simple, can be maintained in the city of New York, while a place for the exhibition of machinery would be apt to fall into the hands of persons who had certain inventions to sell, and would thus become a large bazar.

If a School of Design be attached to the Museum, or a school for any other kind of training, then we bring in other elements and greatly add to the expense.

It would be very graceful, very beautiful, and very refined to keep the museum sacred from the touch of manufactures and trades, but in this conntry, and in times like the present, and in a country like ours, it it a question whether it is expedient and wise to follow European nations on this point. Our country is great in consequence of its commerce, its manufactures, its inventions, its labor-saving and humanizing improvements in every department of society, and any plan that omits these things will lose the sympathy of the people, and be wanting in the distinguishing features of our civilization.

We therefore suggest that the Metropolitan Museum of Art must show theory and practice combined to secure success. If there are architectural models and drawings in one part of the building, there ought to be in another an exhibition of the best building material and the machinery used in construction. Designs for calico printing may well be flanked by the goods and the raw material, and the machinery to make them. Fine photographs suggest the camera, the chemicals, the laws of light, and diagrams explanatory of the whole operation. A section devoted to agriculture may be made very comprehensive, so as to include the works of art that ought to adorn a country home, and thus afford an opportunity for the display of imagination. We could further explain our idea by drawing numerous illustrations from all of the decorative and formative arts, but enough has been said to elucidate our meaning, and to offer some suggestions to the committee who have the onerous duty of presenting a comprehensive plan to the corporation. It is to be hoped that the scheme for a Metropolitan Museum of Art will not fall through, but that it will be pushed to a successful termination.

THE ORIGIN OF THE RELUCTANCE WITH WHICH MANKIND RECEIVE NEW IDEAS AND INVENTIONS.

A correspondent who has met with disappointment and trouble in introducing a valuable invention, anxiously inquires why it is "that mechanics and even some scientific men oppose any new invention which differs from their experiences and previous teachings, and which seems to show that something can be accomplished which they have hitherto deemed impossible."

This correspondent has been surprised to hear men who pretend to be mechanics and engineers condemn an invention without even becoming acquainted with its construction. He has heard people say that the results claimed were every way desirable, but fortunes had been expended in the pursuit of the same objects without success, and therefore they were impossible. He thinks this kind of proceeding very illogical and unjust, and wonders why men thus judge prematurely and without evidence upon subjects presented to their consideration.

We do not deem this a matter of surprise. That is only surprising which is unusual. The course pursued by the majority of mankind is precisely that of which our correspondent complains, and this, whether they be mechanics, engineers, theologians, lawyers, or so-called social reformers.

How often have theologians denied demonstrated facts, simply because they feared that some remote—and at the time dimly conceived—conclusion possible to be derived from its admission, would sap the foundations of some favorite dogma, and, reasoning precisely as our correspondent describes, "It conflicts (or may be found to conflict) with our belief, therefore it is impossible it should be true," have sought to erect barriers against the advance of truth, and set themselves to oppose the progress of science.

How often has the medical profession committed the same sin against reason. How frequently have political economists, legislators, and reformers manifested the same blind bigotry.

Prejudice sways far more minds than reason, and this is why there is such an extensive market for ready-made opinion; why doctrines and creeds are put up in assorted packages, like flower seeds, the selection being left to the salesman, who is supposed to know more about the matter than the purchaser.

The anticipation of temporary personal inconvenience resulting from any innovation, prevents many from cordially embracing improvements, which, adopted, would benefit the entire race. Every new improvement limits the application of old things, while it increases the market for labor in its department of industry. But the men accustomed to the old order of things find themselves compelled to suffer some inconvenience in learning the new routine, and they care little for the general benefit, so long as they cannot see that their individual interests will be materially advanced. It they cannot see this, they are indisposed to accept the temporary inconvenience, no matter how much good may result to others. This is profoundly selfish; but, sad as is the admission, selfishness is a universal vice. "What's the odds so long as *I'm* happy," is oftener the rule of life than the sweet rule of "Love thy neighbor as thyself."

Then again, the world is full of powerful vested interests, which universally revolt against all advances which do not strengthen their hold upon the consciences and opinions, and therefore the purses of mankind. Few of these organizations have much in common; so that what one supports the others generally oppose. Thus opposition to advancement of all kinds, in all fields of science or art, is and must be the universal rule until man himself has advanced far beyond his present moral standard.

The work of any man then who would benefit himself by the introduction of any improvement must be a sharp warfare. He must make up his mind to suffer misrepresentation, insidious attacks from unknown quarters, open ridicule, and perhaps attempts to defraud him of his just legal rights. This opposition cannot be met and combated by all men, and there are instances on record of such organized opposition as even the stoutest would shrink to encounter; in which the liberty and even the lives of innovators have been jeopardized or sacrificed. Thank God! it is not quite so bad as that in our own land and time, but reports reach us that in England, whose boast is that every native-born son is entitled to the protection of the Government, and which sends expensive expeditions to barbarous lands to rescue a few citizens from confinement, even life is not at this moment secure to the man who dares even adopt an improvement, against the will of organized bands, sworn to oppose such improvements.

A correspondent of the *Times* writes:

"Rattening has recommenced at Sheffield, and at Manchester; a master builder has been dogged, watched, warned, so that he dared not sleep in his own house; his coachman did not dare to drive him; his premises have been set on fire, and attempts made to blow them up with gunpowder because he refused to comply with some trade regulation—using stone cut at the quarry or brick made by machinery. Every Englishman is taxed, if not otherwise outraged, by these trade regulations, which cover the island like a net."

This is a sad state of affairs to exist in a highly civilized land, and in the nineteenth century, but it shows that our present civilization is merely a crude experiment, and that until careful and well conducted experiment has been substituted for the belief that a large number of sections in our social code have been permanently settled by divine edict, it is egregious folly to talk about such a thing as social science.

NEW SUGAR REFINING PROCESS.

In the sugar house of Messrs. A. Sommier & Co., of Paris, 200,000 pounds of raw sugar have for a year past been daily refined according to a process invented by Boivin and Loiseau. The process is founded upon the use of a new body, the sucrate of the hydrocarbonate of lime, which the inventor employs for the purification of raw sugar instead of blood, bone-black, etc. For the preparation of this compound, milk of lime is made from the waste sweet liquors of the refinery, and enough sirup added to give the mixture 20° Baumé. This is well agitated and run through a cooler until the temperature sinks to 68° Fah. From the agitators the liquid flows into vats, where it is partially saturated with carbonic acid—the gas is passed through until the desired precipitate of sugar, lime, and carbonate of lime settles as a gelatinous mass. After the purifying agent has been thus prepared, it is applied in the following manner:

The raw sugar is dissolved in a cylindrical pan, similar to a vacuum pan, under diminished pressure. Revolving buckets carry it into receivers over the boilers, and from these it is permitted to flow into the boilers, where it comes in contact with the sucro-carbonate of lime previously introduced, in a quantity proportional to the percentage of raw sugar. They generally take about 650 gallons of the gelatinous sucro-carbonate to 8,000 lbs. of sugar. Water is added if necessary; the whole is boiled, and in this way the solution and clarification are simultaneously accomplished. One great advantage of the operation is that when sirup is boiled in presence of lime, ammonia is evolved, all glucose is decomposed, and anything likely to produce fermentation is destroyed.

The sirup from the boilers is filtered, the excess of lime separated by carbonic acid, and it is further concentrated and finished in the usual manner. The slimy residues and precipitates are squeezed out in filter presses until they contain no trace of sugar, and can be thrown away. The wash water is used in the preparation of new material. The advantages of this new process are that it does away with the use of blood, which is offensive, difficult to obtain, and the soluble constituents of which are finally concentrated in the molasses.

It also yields greatly improved products, which are brighter in color and better in grain. The third crystallization of this process is better than the second in the old way. The expense is if anything less, certainly not more. The process has been patented in the United States.

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THE QUESTION OF CITY TRANSIT.

Having given the views of several prominent citizens upon this question in recent issues, which views we think fairly represent the various opinions prevailing upon the several projects lately urged as being each a solution of the question of rapid transit in the city of New York, we will add in brief our own opinion, and drop the present discussion of the subject.

First, in regard to the Pneumatic Tunnel, we would say that its projectors regard the question of the practicability of pneumatic propulsion as settled. If, however, they should be able to obtain a charter, and upon the completion of the work the pneumatic system should fail, as some predict, the main thing, an avenue for transit, the tunnel, will be secured, and it can be worked by locomotives, or any other motive power found most desirable.

We believe tunnels afford the most practicable means for effecting the desired object without interference with property, or obstructing the streets; and if the Pneumatic Railway Company have done nothing else, they are entitled to the gratitude of the public for demonstrating that such tunnels can be built and operated without even temporary inconvenience to surface travel.

We prefer that such tunnels should be constructed under other streets than Broadway, although, as Mr. Martin stated in our last issue, the business of upper Broadway will be, in our opinion, increased by a tunnel under it.

We do not regard with favor elevated railways of any kind. The Arcade plan is, we think, a wildly visionary scheme, one that never can and never will be carried to completion.

The tunnel system has more to support it than any other, and we have no doubt of its ultimate adoption. But *when*, is a question more easily asked than answered. So long as Broadway remains untunneled, so long will capitalists hesitate about building parallel lines, liable to be subsequently placed in competition with that more popular route. So either by some legislative enactment (which seems impossible) any tunnel under Broadway must be prohibited forever, or it were best to grant some good company a charter to push such a tunnel to speedy completion.

While this state of hesitation prevails the city is suffering untold loss from the removal of its citizens to neighboring towns, and the patient public groans, and "grins and bears" a state of things, which disgraces the enterprise and liberality of the American metropolis.

SOMETHING ABOUT HORSESHOES.

History does not reach back to a period when the horse was not a companion and servant of mankind; and in the earliest periods of which we have any reliable record, the ingenuity of men was taxed to invent trappings for the decoration, and armor for the protection of this noble animal, whose services in war are no less conspicuous than his patient labor in peaceful avocations is indispensable alike to civilized and barbarous races.

Precisely when the foot of the horse began to be protected by some form of shoe is unknown, but the necessity for it must have arisen with artificial roads, or when it was found necessary to employ the animal in traversing rocky wastes.

The anatomy of the horse indicates that his natural haunts are broad and grassy plains, where his fleet foot may spurn the yielding turf without injury, and where an ample supply of his favorite forage may be found.

In this state he may now be found on the extensive table-lands of Texas, and the *pampas* of Mexico, where his feet need not the assistance of veterinary art.

The Greeks and Egyptians practiced horse-shoeing in a manner which, so far as can be ascertained, consisted of applying a kind of sock or sandal, fastened about the leg with straps, and shod with iron or other metal, for strength and extra wear. These were probably not generally employed, but were used only in cases of disease or injury. It is highly probable that the primitive horseshoes were made of raw hide, stitched or laced upon the foot.

The ancient Britons do not seem to have known the art of horse-shoeing. The first indications of this practice, so far as archæologists have been able to discover in England, belong to what is known as the Romano-British period. There is, therefore, little doubt that horseshoes were introduced into England by the Romans.

Specimens of these horseshoes, more or less preserved, have been unearthed in various localities. They appear to have been without toe-calks, but have heel-calks like our modern horseshoes. They have mostly three nail holes in each branch of the shoe, and instead of a groove in each branch, like the shoes of the present day, have large oval depressions for the heads of the nails. These depressions were evidently stamped in while the iron was hot, which operation spread the metal so as to form three distinct scallops on each side of the shoe.

The Anglo Saxon horseshoe was in its earlier forms a cumbrous and ill-shaped affair, not comparable in regularity of form to the Roman shoe; but its outer edge is not scalloped like the Roman shoe.

The art of horse-shoeing was considered of the first importance by the Normans, and those who excelled were employed in the royal establishment, and endowed with landed estates and titles of honor.

The efficiency of the horse in battle and his usefulness in times of peace, depending as they do in so great measure upon his being properly shod, justify the importance attached to this art in medieval as well as modern times. The saying of "Poor Richard," "For want of a nail the shoe was lost; for want of a shoe the horse was lost; for want of a horse the rider was lost;" has been verified in many a retreat, and many a traveler has been exposed to imminent peril by the loss of a shoe from the foot of his horse.

That interest in the further improvement of the horseshoe is not yet extinct is proved by the fact that we have illustrated and described within the past year or two several improvements of this kind, and a glance through the records of the Patent Office will show that nearly every year brings forth something of this sort. It is within the last quarter of a century that the extensive manufacture of horseshoes by machinery has been originated and developed, and the article has been much cheapened thereby. Thus this ancient device has probably not yet reached a point beyond the scope of inventive genius and skill, and the time may even come when the manufacture of malleable cast iron may be so perfected as to enable them to be cast at much less than their present cost, and of as good quality as those now made of wrought iron by machinery.

RECENT FOREIGN IMPROVEMENTS.

The removal of the dangers which attend the work of miners has given rise to many recent improvements in ventilating apparatus, safety lamps, etc. Among these we notice an English invention, in the application of which the gas is drawn off by fans, turbines, exhaust pumps, heat, or other mechanical means. Where gas is known to exist the inventor taps, or drills holes in the wall, and connects pipes to the holes, and then exhausts the gas by means before mentioned. He taps known blowers with a large hole either in the solid or at the fracture, but prefers the solid, as there is more certainty in governing the escape, and when it is unsafe for the gas to enter the ordinary air courses he provides pipes, sewers, or passages to allow it to flow away to a safe place, or to be collected in chambers and then drained off in non-working hours or otherwise, as convenient.

A firm in Bristol, England, have invented an improvement in fire-boxes for locomotives, whereby liquid hydrocarbons may be used as fuel. They construct a closed fire-box, or furnace, lined, by preference, with fire-brick or ganister, into which atmospheric air and liquid hydrocarbon are forced by a pump worked by the engine, for which purpose the hydrocarbons may be made to issue from a small pipe situated centrally inside the air pipe, the air and hydrocarbon being made to pass into one or more perforated tubes in the bottom lining into the furnace, from the perforations of which tube, or tubes, they issue through corresponding perforations in the lining into the furnace, where they enter into combustion. Or the air and hydrocarbon may be forced through separate pipes and apertures into the furnace. In the furnace are arranged walls or loosely piled pieces of fire-brick, with interstices between them, into which the flames and hot gases resulting from the combustion rise, so as to heat the fire-brick to a high degree, and thus produce a reservoir of heat.

A Vienna inventor has made a novel improvement in feeding boilers which consists in forming the water nozzle of injectors at that part immediately preceding and following the steam outlet with spiral grooves like the grooves of a rifle, but running out plain.

A curious English device is a wire packing for glands. The inventor constructs gland packing by coiling, rolling up, or twisting woven wire, such as wire gauze, upon a core, or or otherwise, until the coil or roll becomes of such a diameter that when bent in the form of a ring and passed around a rod into the gland it will fill up the space between the two. The sheet of woven wire may be coiled, rolled, or twisted either by hand or machinery and either in the direction in which the wires in the sheet are or in an angular direction, or the wire may be at once woven into a coil, roll, or rope, either in the form of rings of the required size or in lengths to be afterwards bent into the required form and size; the fibers of the wire gauze acting against the rod intercepts a certain portion of the steam, which condensing, remains there, and in that condition serves to lubricate the rod in its reciprocatory or rotary motion.

An invention in pulley blocks made in Sheffield, England, is worthy of notice. The inventor makes use of the well-known principle of the endless screw or worm and worm wheel, and by a novel arrangement of parts he makes them applicable to the purpose for which pulley blocks are ordinarily used, that is, for the purpose of moving or raising heavy weights; thus he makes by casting in malleable, or cast iron, or other metal, a worm wheel of the size required, and then by cutting or casting makes a worm or endless screw to correspond with and work into such wheel. He then makes either in cast or malleable iron, or by forging, a frame which shall contain the hook from which the whole is to be suspended, and likewise the above worm and wheel, the worm being carried in suitable bearings, either in the top or bottom of the frame, and the axis of the worm wheel in bearings in the side cheeks thereof.

An English improvement in dock gates is the formation of the caisson or dock gate in such a manner as to be able to admit water through holes or through a valve or cock in the bottom or lower part of the caisson or dock. The upper part of the same above the water is made air-tight, so that as the water is admitted the air in this upper part or chamber becomes compressed, or by opening a cock is allowed to escape. When it is desired to regulate the buoyancy of the caisson or gate, or empty it of water, the inventor closes this cock and opens another, or he uses a three-way cock, which answers the purposes of the two cocks, which shall be connected by pipes or flexible hose to a chamber of compressed air, or an air pump, and by either of these means compresses air into the space above the water, and thus drives or forces out the water through the holes, cock, or valve through which it entered at the bottom, and thus regulates the depth of immersion of the dock gate or caisson in the water or, if need be, drives out the whole of the water.

SCIENTIFIC INTELLIGENCE.

ALUMINA SALTS FROM CRYOLITE.

One hundred parts of finely pulverized cryolite are mixed with eighty-eight parts of quicklime stirred up to a thin liquid, and the whole is brought to boiling by steam in water tubs. As soon as the fluor-spar has settled, the clear lye is decanted and afterwards neutralized with commercial acetic acid, which operation will require about 236 parts of 6° B. After this has become entirely clear, two thirds of the solution (about 807 parts by weight) are drawn off, and when evaporated will yield pure acetate of soda. With the remaining mass is now one atom soda and one atom alumina, this is decomposed by one equivalent acetic acid and two equivalents sulphuric acid (46 parts of 1·83 specific gravity), and after thorough mixing the salt will form a soda alum with the formula $NaO, SO_3 + Al_2O_3, SO_3$ + acetic acid.

TO BLEACH STRAW.

After soaking in water, boil in a soda solution not so strong as to attack the fiber and bleach by immersion in Javelle water (solution of chloride of potassa—"U. S. Dispensatory)." Remove the smell of chlorine by sulphurous acid. The straw is said not to lose its luster and to remain permanently bleached.

ROLLING MILL SLAG.

This often contains as much as 51 per cent of iron, which is usually wasted. It is proposed to pulverize it, mix it with quicklime, and slake it; the silicic acid, it is thought, would combine with the lime and be liberated in this way, and the iron could be reduced in a furnace. The theory of the operation appears to be all right, and it only remains to prove it by experiment.

BY-PRODUCTS OF CHLORAL.

It is less than a year since chloral was proposed as an anæsthetic and hypnotic agent, and previous to that time a pound of it could not have been found in the world. Since its introduction in medicine, thousands of pounds of it have been manufactured, and the attention of chemists has naturally been called to the incidental products. Some of these are of a purely scientific character, while others can be used in well established industries. Chloral is made by passing chlorine gas for many hours through absolute alcohol; during the operation much hydrochloric acid is given off. This is such a cheap article that it is hardly worth saving, but there are certain ethers formed which can be converted into valuable colors analogous to the much-prized aniline tints made from benzole. The rapid way in which scientific discoveries are now spread abroad is nowhere better illustrated than in the way in which chloral was introduced and everything relating to it made known. There is probably no part of the civilized world in which this valuable medicine cannot now be obtained.

DETECTION OF LOGWOOD COLOR IN WINES BY MEANS OF NEUTRAL ACETATE OF COPPER.

J. Lapeyrere states that, while studying some of the properties of the coloring principle of logwood, he found that the hematine it contains yields a sky-blue color with salts of copper. In order to apply this test to wines for detecting if they are doctored with logwood, it is only necessary to place strips of good filtering paper, Swedish being preferred, into an aqueous solution of neutral acetate of copper, and, after drying, use one of these slips to test the wine suspected to be adulterated with logwood color, by dipping the paper into the wine; and, on removing it from that fluid, care should be taken to cause the adhering drop of wine to flow backwards and forwards over the paper, which is next rapidly but carefully dried. If the wine be as it naturally ought to be, the color exhibited after drying will be gray or rose-red grayish; but, if logwood is present, the tinge will be distinctly sky-blue.

ARTIFICIAL PRODUCTION OF ICE IN INDIA.

Dr. Janssen relates that, in many parts of the Indian Continent, the natives dig shallow pits in such localities which are quite freely open to the sky and distant from trees. The pits are lined with straw, and upon the straw are placed dishes (made of a very porous earthenware) filled with water. During the calm and clear nights prevailing during the period from November to the end of February, the water placed in the dishes freezes, yielding a solid cake of ice, while the temperature of the air is +10°. Dr. Janssen has investigated this curious subject experimentally, and has found that the freezing is principally due to the radiation during the night; but the evaporation of the water, aided by the porosity of the earthenware employed, is not to be overlooked, at the same time.—*Cosmos.*

Tobacco and its Adulterations.

According to John C. Draper, who contributes an able article, against the use of tobacco, to the *Galaxy*, for June, the adulteration of tobacco varies greatly with the character of the preparation. In that intended for chewing, it consists chiefly of molasses or common salt, rarely of leaves of other plants. In cigars and cut tobacco for smoking, it is by no means common, and consists usually of hay, paper, or leaves of the dock, rhubarb, cabbage, elm, and oak, all of which are, comparatively speaking, harmless. In snuff, on the contrary, adulteration is very common, and the substances used are, in many cases, exceedingly injurious, including such articles as chromate of lead, bichromate of potash, powdered glass, and different kinds of ochers or oxides of iron. The latter are nearly always found in the Scotch snuffs, and rarely occur in the Welsh and Irish.

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According to Hassal, out of forty-three specimens, chromate of lead occurred in nine, nearly all of which were Scotch; red lead or oxide of lead in three; and bichromate of potash, which is very poisonous, in three, two of which were Scotch. The presence of the lead compounds mentioned has not unfrequently produced lead palsy in those who have used them, and it is of interest to the snuffing tobaccophagoi to note that these poisonous adulterations occur more frequently in Scotch snuffs.

The substances that give its active properties to tobacco are nicotine and nicotianine. The first is a colorless liquid alkaloid, soluble in water, ether, alcohol, and many oils, and possessing an offensive odor and an acrid, burning taste. It is a very dangerous poison, being almost as energetic as prussic acid, and destroying life in equally small doses, a single drop sufficing in the experiments of Dr. Taylor to kill a rabbit in three minutes and a half. In the well known case of the Count and Countess Bocarmé, this poison was administered by force to the brother of the Countess while dining with them at their château. In this instance death occurred in less than five minutes; and though attempts were made to remove the odor and traces of the poison, by pouring strong acetic acid or vinegar down the throat of the victim, and on his person, the possession of the poison and the circumstantial evidence indicated the guilt of the Count so strongly that he was executed for murder.

The proportion of nicotine in 100 parts of different kinds of tobacco dried at 212° Fah. is as follows:

Virginia	6·87	Lot	7·96
Kentucky	6·02	Lot-et-Garonne	7·34
Maryland	2·29	Alsace	3·21
Havana	2·00		

Nicotianine is a concrete volatile oil, sometimes spoken of as tobacco camphor. It is obtained by the distillation of the leaves, six pounds yielding about eleven grains of the oil. It has a bitter taste and the odor of tobacco, and produces the same effect on the tongue and throat as tobacco smoke. It is almost as deadly when applied externally as nicotine is when taken internally, its action being nowhere better described than in "Hamlet" when the ghost tells of the

> . . juice of cursed hebanon, . .
> . . . . . .
> The leprous distilment, whose effect
> Holds such an enmity with blood of man,
> That, swift as quicksilver, it courses through
> The natural gate and alleys of the body,
> And with a sudden vigor it doth posset
> And curd, like eager droppings into milk,
> The thin and wholesome blood.

Landerer states that this oil does not exist in the fresh leaves, and Pereira remarks that it is probably formed by the action of the air in the process of drying. There is but little satisfaction to be drawn by the tobaccophagoi from these statements, even if they are admitted to be true, since the plant is invariably dried before it is used, and must therefore always contain the oil.

Tobacco smoke being the most common form under which the system is exposed to the action of this plant, it is necessary that we should examine into its composition. The results of many analyses show that while the alkaloid disappears almost entirely in the smoke, the oil is increased; it therefore follows that in chewing, the effects will be chiefly those produced by nicotine, while in smoking nicotianine will be the more active ingredient. In addition to the oil, it has been recently stated that prussic or hydrocyanic acid exists to an appreciable extent in tobacco smoke. This is a possible, but probably exceptional product, its presence being dependent upon some peculiarity in the manner of combustion.

Poisonous Cosmetics.

[Condensed from the American supplement of the Chemical News].

In December last Dr. Lewis A. Sayre inclosed to Dr. Harris, Sanitary Superintendent of the Metropolitan District, a pamphlet in which he described three cases of lead palsy produced by Laird's Bloom of Youth. This communication was laid before the Board of Health, together with notes from Dr. Harris and Sanitary Inspector Dr. Janes, in which attention was called to the great variety and large quantities of poisonous hair dyes, commonly called hair restoratives, etc., consisting essentially of acetate of lead, and enamels consisting of carbonate of lead, which were sold in the Metropolitan District.

The Board at once directed the chemist, Dr. C. F. Chandler, to investigate the subject, and his report, which is here presented, fully confirms the opinions of the physicians. It was found, however, in the course of the investigation, that Laird's Bloom of Youth, the original cause of the investigation, no longer consisted of carbonate of lead, but was composed of oxide of zinc. As soon as this was established by the report, the proprietor, who had admitted to the writer that his preparation had formerly consisted of a lead compound, complained with an air of injured innocence that the Board of Health *had inflicted a great wrong upon him, had almost ruined his business.* Articles have been inserted in the daily papers, in the interest of the Bloom of Youth, which reflect upon the chemist to the Board, as though he had wantonly, or by mistake, attacked an innocent citizen, and interfered with an honest business. We hold that inasmuch as the Bloom of Youth has been for years composed of carbonate of lead, and we know this of our own knowledge, as a bottle was purchased about two years ago, at a drug store on Broadway, and tested at the School of Mines, which had this composition, and as, according to Dr. Sayre and Dr. Hammond, this preparation had produced lead palsy, the proprietor of the article has no just claim for sympathy, even though he has finally, after so much harm has been done, changed its poisonous character.

In response to the resolution of the Board, directing "the chemist to examine the various hair tonics, washes, cosmetics and other toilet preparations in general use, and report what ingredients, if any, they contain of a character injurious or dangerous to those who use them," examined and reported upon various hair tonics, washes, and restoratives; lotions for the skin; enamels; white powders for the skin.

Sixteen were examined, and, with but one exception, all were found to contain lead, generally in the form of acetate or sugar of lead, which metal seems indeed to be the *essential constituent* in most cases. Most of the sediments observed in the bottles, and which require that the bottle "*be well shaken,*" etc., consist of sulphur, which is intended shall ultimately unite with the lead, to produce the dark-colored sulphide of lead, or, as one of the manufacturers has it, "*the original youthful beauty and color.*" The following tabular statement shows how the poisonous hair nostrums compare among themselves:

GRAINS OF LEAD IN ONE FLUID OUNCE.

1.	Clark's Distilled Restorative for the Hair	0·11
2.	Chevalier's Life for the Hair	1·02
3.	Circassian Hair Rejuvenator	2·71
4.	Ayer's Hair Vigor	2·89
5.	Prof. Wood's Hair Restorative	3·08
6.	Dr. J. J. O'Brien's Hair Restorer of America	3·28
7.	Gray's Celebrated Hair Restorative	3·39
8.	Phalon's Vitalia	4·69
9.	Ring's Vegetable Ambrosia	5·00
10.	Mrs. S. A. Allen's World's Hair Restorer	5·57
11.	L. Knittel's Indian Hair Tonique	6·29
12.	Hall's Vegetable Sicilian Hair Renewer	7·13
13.	Dr. Tebbett's Physiological Hair Regenerator	7·44
14.	Martha Washington Hair Restorative	9·80
15.	Singer's Hair Restorative	16·39

With the exception of Perry's Moth and Freckle Lotion, lotions for the skin were found entirely free from lead or other injurious metals.

Seven enamels for the skin consist of white powders suspended in clear liquids; on standing the powders subside, but agitation quickly incorporates them with the liquids again. The following contain lead, mostly, if not entirely, in the form of *carbonate;* they are therefore simply "white lead" ground in water.

GRAINS OF LEAD IN ONE FLUID OUNCE, AFTER SHAKING.

Eugenie's Favorite	108·94 grains.
Phalon's Snow-White Enamel	146·28 "
Phalon's Snow-white Oriental Cream	190·99 "

Seven white powders consist of carbonate of lime, carbonate of magnesia, clay, or "French chalk," either singly or mixed. Nothing injurious was detected in any one of them.

It appears therefore that the hair tonics, washes, and restoratives contain lead in considerable quantities; that they owe their action to this metal, and that they are consequently highly dangerous to the health of persons using them.

That with a single exception, Perry's Moth and Freckle Lotion, which contains corrosive sublimate, the lotions for the skin are free from lead and other injurious metals.

That the enamels are composed of either carbonate of lime, oxide of zinc, or carbonate of lead, suspended in water. The first two classes of enamels are comparatively harmless, as harmless as any other white dirt when plastered over the skin to close the pores and prevent its healthy action. On the other hand, the enamels composed of carbonate of lead are highly dangerous, and their use is very certain to produce disastrous results to those who patronize them.

The white powders for the skin are harmless, except in so far as their application may interfere with the healthy action of the skin.

A Huge Mastodon.

A correspondent informs us that a huge mastodon has been found four miles from Tecumseh, Mich., on the farm of Mr. Wells Goheen. The tusks were exhumed first, but like some of the bones, were too much decayed to be kept whole; but the forms were perfect in the clay, so that the size and shape were taken perfectly.

The tusks are ten feet long, besides two or more feet that entered the skull, which was detached. Their diameter at base was 9½ inches, sections of skull are 2 inches thick, a section of the vertebræ measured 18 by 10 inches, but a portion was decayed and crumbled off, so that a full measurement could not be had, but it was originally 24 inches across. One tooth measures 8 by 4⅛ inches, and weighs 6 pounds. The thigh bones are 3 feet, 10 inches long, 11½ inches wide at the upper, and 10 inches at the lower end. Ribs 6 feet in length. A tooth, all perfect, in a section of the lower jaw, was found under an oak tree. The circumference of the tree was five feet. Tibia, 2 feet, 6 inches long; the bones are much scattered, only about half are yet found, but Dr. E. Hause, who has the matter in charge, is determined to get all that he can of the monster and send it to the State University of Ann Arbor, Mich.

It is supposed by some scientific men that, as the ground around where the bones were found ascends or rises 1 foot to the hundred with soil heavy, and with 2½ feet of clay and muck over the bones, that the animal died two thousand years ago. As the bones are much broken, they evidently lay uncovered many years.

By the bones found our correspondent judges the mastodon to have been very large, perhaps the largest yet found. The length 30 feet, hight from 13 to 15 feet, and very old, as some of the five teeth found are much worn. A portion of one tusk is 4 feet long; the balance (one or two bushels) is in small pieces.

SAYS Max Müller "for the discovery of truth there is nothing so useful as the study of errors, and we know that in alchemy there lay the seed of chemistry, and that astrology was more or less a yearning and groping after the true science of astronomy.

GEORGIA STATE FAIR.

We are indebted to Messrs. Glenn, Wright & Co., Commission Merchants and Manufacturers of Agricultural Machinery at Atlanta, Georgia, for the premium list of the State Agricultural Society of Georgia, with regulations, special notices, etc. The fair will commence October 19, and close October 26, of the present year. A fine list of premiums is offered in the department of Mechanics' and Farming Implements, as also in Chemical Manufactures and Minerals. Competition is restricted on some articles to Georgia, but on most it is open to all the States. Those desiring to avail themselves of this opportunity to introduce improvements adapted to Southern agriculture, would do well to communicate with the Assistant Secretary, Thomas C. Howard of Atlanta, Ga.

The manufacturers of machines, implements, instruments, tools, etc., are requested to send their latest published illustrated catalogues and price lists. The Secretary requests the contribution of specimens of their machines, etc., for preservation and permanent exhibition in the Museum, upon such terms as to expense of thus advertising for the manufacturers as may be agreed upon with the Secretary. The arrangement of the office and museum will be designed for the exhibition and advertisement to the best advantage of all articles thus intrusted to it. The Secretary will send on orders to the manufacturers for all articles sold by this means of advertisement without commission charged either to the manufacturer or the purchaser. The intention being to make the office and museum a convenience to the members of the Society in making examination and purchase of all articles submitted to it.

A PNEUMATIC TUBE FOUR HUNDRED MILES LONG.

Under this heading a statement is going the rounds of the newspapers, purporting to come from a correspondent of the Boston *Transcript,* relative to a pneumatic tube, said to extend from Glasgow to London, the operation of which was witnessed by the correspondent. He says:—"I inquired if I might see a message sent. 'Oh yes, come round here.' He slipped a number of messages into the pasteboard scroll, popped it into the tube and made a signal. I put my ear to the tube, and heard a slight rumbling noise for seventeen seconds, when a bell rang beside me, indicating that the scroll had arrived at the General Postoffice, four hundred miles off! It almost took my breath away to think of it."

We are sorry to be obliged to take the breath out of this story, which seems to be very popular, and everybody wishes it were true.

But, in the first place, there is no pneumatic tube between Glasgow and London. Second, if there were one it would be impossible, by any known means, to cause air to pass through it, at anything like the velocity above stated. Four hundred miles in seventeen seconds, is at the rate of over eighty-four thousand miles an hour. This is a hundred and forty times faster than a cannon ball, which flies 600 miles per hour.

NATIONAL EXHIBITION OF THE ARGENTINE REPUBLIC.

We are in receipt from Mr. Henry I. Zimmermann, one of the directors of the National Exhibition, to be held at the city of Cordova, Argentine Republic, commencing on the 15th of October next—of several copies of the regulations and instructions for foreign exhibitors.

It is hoped that United States manufacturers will be well represented, as there is a probability that from European states there will be a considerable display.

Mr. Zimmermann suggests that all kinds of agricultural instruments of the most improved patterns, as also brick machines, locomotive engines, fire engines, enameled slate mantels, etc., be sent.

Mr. Evans, C. E., Exchange Buildings, New York, who has had much experience in locomotives on the west coast, will be able to furnish any information required respecting the class of engines most suited for the country.

Further information may be obtained on application to Mr. Edward F. Davison, Argentine Consul, New York.

REDUCTION OF THE PUBLIC DEBT.

The report comes from headquarters that during the month of May the public debt of the United States was reduced fourteen million dollars. The Secretary of the Treasury seems determinrd to expend, if not exhaust, the energies of the country in the payment of the debt. On general principles we doubt the wisdom of this policy, and its justice is, to say the least, very questionable. The present generation has already borne its share of the great burden imposed by the recent war. Some regard ought to be shown to the interests of the people at the present time, and a portion of the burden transmitted to posterity.

THE Industrial Classes of the United States have been the subject of a long and interesting report by Mr. Francis Clare Ford, Secretary of the English Legation, at Washington. This report was made in pursuance of a circular addressed by Lord Clarendon, in April, 1869, to the diplomatic and consular agents of Great Britain, instructing them to report upon the condition of the industrial classes in the countries to which they were accredited. Mr. Ford says that the American system of common school education has elevated the condition of the native-born working man, and has disposed him to prefer occupations in which the exercise of the brain is in greater demand than those of the elbow, and asserts that the steady influx of immigrants for the last twenty years has created a disinclination on the part of American workmen to engage in the rough toil of purely muscular labor which the newly-arrived foreigner is ready to exert for his support.

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PATENT OFFICE AFFAIRS.

The business of the Patent Office is now in a flourishing condition, and the present is a favorable time to enter applications. Inventors will find the SCIENTIFIC AMERICAN PATENT AGENCY ready to attend to the prosecution of claims with the greatest dispatch. By reference to our register, we find that we have made upwards of twenty-four thousand preliminary examinations into the novelty of alleged new inventions. This great experience, together with the fact that a large proportion of all the business with the Patent Office, for the past twenty years, has been conducted through this Agency, suggests to inventors the surest and best means to secure their rights.

We give opinions free, and all we require is a rough sketch and description of the invention.

Inventions patented through this Agency receive notice in the SCIENTIFIC AMERICAN.

MODELS.—In order to apply for a patent the law requires that a model shall be furnished, not over a foot in any of its dimensions, neatly and substantially made. Send the model by express, prepaid, addressed to Munn & Co., 37 Park Row-New York, together with a description of the operation and merits of the invention.

CAVEATS.—Whenever an inventor is engaged in working out a new improvement, and is fearful that some other party may anticipate him in applying for a patent, it is desirable, under such circumstances, to file a caveat, which is good for one year, and, during that time, will operate to prevent the issue of a patent to other parties for the same invention. The nature of a caveat is fully explained in our pamphlet, which we mail free of charge.

EUROPEAN PATENTS.—Probably three-fourths of all the patents taken by American citizens in Europe have been secured through the SCIENTIFIC AMERICAN PATENT AGENCY. Inventors should be careful to put their cases in the hands of responsible agents, as in England, for example, the first introducer can take the patent, and the rightful inventor has no remedy. We have recently issued a new edition of our Synopsis of European Patent Laws.

All communications and inquiries addressed to Munn & Co., respecting patent business, are considered as strictly confidential.

A Shower of Shell-Fish.

Our authority for the following account is a recent number of the *American Naturalist.* Mr. John Ford exhibited to the Conchological Section, Academy of Natural Sciences, Philadelphia specimens of *Gemma gemma,* remarkable as having fallen, accompanied by rain, in a storm which occurred at Chester, Pennsylvania, on the afternoon of June 6, 1869. The specimens were perfect, but very minute, measuring one-eighth inch in length by three-sixteenths of an inch in breadth. Though most of the specimens which fell were broken, yet many perfect ones were collected in various places, sheltered from the heavy rain which followed their descent. A witness of the storm, Mr. Y. S. Walter, editor of the *Delaware County Republican,* assured Mr. F. that he noticed the singular character of the storm at its very commencement, and, to use his own words, "it seemed like a storm within a storm." A very fine rain fell rapidly, veiled by the shells, which fell slower and with a whirling motion. Judging from the remains of animal matter attached to some of the specimens, together with the fresh appearance of the epidermis, it is highly probthat many of them were living at the moment of transition. This minute species resembles a quahaug shell, and is common on the seashore between tide marks.

THE imperial printing office at Constantinople is becoming an important institution. The "Arabian Nights" can now be printed amidst the scenes they describe. What genii ever accomplished more? At this office sixteen steam printing presses are now employed, besides several excellent lithographic presses, and a correspondingly large staff of compositors. In addition to the official paper, the *Takvimi Vaki,* and all the government work, it prints a number of commentaries on the Koran and other religious publications, as also general job work for the public. It has recently published two works of special interest, the Arab text of "Abulfeda's History of the Caliphs."

A NUGGET of pure copper, weighing 117 pounds, was discovered in an Iowa field the other day. It had been kicked about for years, under the supposition that it was a stone. Finally, the tooth of a harrow scraped against it, making a bright streak, which revealed its true nature. It is pure metal without the least alloy, stone, or quartz. The locality where discovered is in Cedar township, Monroe county, and hopes are entertained that extensive deposits may underlie the whole region.

STEEL needles first came into England from Spain and Germany. They were first manufactured in London by a German, in 1565.

VIOLINS were invented in 1477, and introduced into England by Charles II.

The Universal Wringer—It gives us pleasure to call special attention to the "Universal Clothes Wringer." We have had it fairly tested, and are, therefore, able to speak of it with confidence, as an article of real and substantial merit, which only needs to be known to become what its name imports, "Universal," in its use, and in the approval with which it shall be received.—[New York Christian Advocate.

Facts for the Ladies.

On the 14th of February, 1854, my husband made me a present of a Wheeler & Wilson Sewing Machine. For nearly fifteen years it has done its work (hundreds, yes, thousands of dollars' worth), and is this day as perfect a sewer as when I first got it. It has never been the least out of repair. During the war I kept one needle in constant use, and I have more than half the original dozen of needles given with the machine on its purchase.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per line will be charged.

The paper that meets the eye of manufacturers throughout the United States—Boston Bulletin, $4·00 a year. Advertisements 10c. a line.

Situation Wanted, by a sober, steady man, in a Petroleum Oil Refinery. Understands repairing and keeping machinery in good working order. Address A. Hall, P. O., Williamsburgh, L. I.

For Sale Cheap—1 set Hamilton's Patent Muley Hangings. address Morrison & Harms, No. 386 River ave. Allegheny City, Pa.

For Fourneyron and Jonval Turbine Water Wheels, Mill-work, Shafting, Pulleys and Hangers, apply to J. Cornell & Co., Sandy Hill, N.Y.

For the best Upright Saw Mill, in the world, address Morrison & Harms, No. 386, River ave., Allegheny City, Pa.

Everybody who uses the Broughton Oil Cups speak of them very highly. They are manufactured only by H. Moore, 41 Center st., N.Y.

A valuable patent for cutting files. A Machine in operation. For sale on reasonable terms. E. F. Rost, 22d st. and 2d Avenue, New York.

Machinists and others using Fine Tools, send for illustrated catalogue. Goodnow & Wightman, 23 Cornhill, Boston.

Rawhide Carriage Washers are cheaper than leather, and run with less noise than any other. Darrow Manufacturing Co., Bristol, Conn.

Manufacturers of Galvanized Wrought Iron Pipe, and of Rubber Hose, send price lists to A. P. Smith, Rock Falls, Ill.

Parties wishing to manufacture a good article, which will find ready sale, at good profit, should address N. Evinger, Sandford, Ind. See advertisement on another page.

Scientific American.—Back Nos., Vols., and Sets for sale. Address Theo. Tusch, City Agent, 37 Park Row, New York.

Owners of Patents address circulars to Robinson & Beard, Kaufman, Texas.

$100 a day can be made by selling Lloyd's new dollar double maps of America and Europe. See advertisemet on last page.

Pictures for the Sitting Room.—Prang's latest Chromos, "Flowers of Hope," and "Flowers of Memory." Sold in all Art and Book Stores throughout the world.

Tempered Steel Spiral Springs for machinists and manufacturers. John Chatillon, 91 and 93 Cliff st., New York.

Shop, Town, County, or State Rights for sale, for Patent Coal Scuttle. For circular, etc., address T. T. Markland, Jr., 1515 South st., Philadelphia, Pa.

Galvanized iron ventilating skylights, straight and curved extension lights, conservatories, etc., under patents dated 1869-70, are approved by every architect. For Rights address Geo. Hayes, 75 8th ave., New York.

Spools of all kinds, and spiral shade tassel molds made by H. H. Frary, Jonesville, Vt.

Dickinson's Patent Shaped Carbon Points and adjustable holder for dressing emery wheels, grindstones, etc. See Scientific American, July 24th, and Nov. 20, 1869. 64 Nassau st., New York.

Peck's patent drop press. Milo Peck & Co., New Haven, Ct.

L. L. Smith, 6 Howard st., N. Y., Nickel Plater. First Premium awarded at the late Fair of the American Institute. Licenses granted by the United Co., 17 Warren st., New York.

One 60-Horse Locomotive Boiler, used 5 mos., $1,200. Machinery from two 500-tun propellers, and two Martin boilers, very low. Wm. D. Andrews & Bro., 414 Water st., New York.

Kidder's Pastilles.—A sure relief for Asthma. Price 40 cents by mail. Stowell & Co., Charlestown, Mass.

Pat. paper for buildings, inside & out, C. J. Fay, Camden, N. J.

Stiff, heavy, powerful lathes, planers, shapers, slotters, and radial drills, in stock. E. & A. Betts, Wilmington, Del.

Second-hand donkey pumps, 12, 25, and 35-H. engines, leather hose, old style blowers, cocks, valves, etc., etc. Wm. D. Andrews & Bro., 414 Water st., New York.

Steel Makers' Materials—Wolfram ore, oxide manganese, Speigel iron, borax, titanium, chrome, lubricating black lead, for sale by L. & J. W. Feuchtwanger, 55 Cedar st., New York.

An experienced mechanical and railway engineer wishes a position as Master of Machinery, or Manager. Address "Engineer," Station "G," Philadelphia, Pa., Postoffice.

For solid wrought-iron beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Keuffel & Esser, 71 Nassau st., N.Y., the best place to get 1st-class Drawing Materials, Swiss Instruments, and Rubber Triangles and Curves.

For tinmans' tools, presses, etc., apply to Mays & Bliss, Brooklyn, N. Y

Glynn's Anti-Incrustator for Steam Boiler—The only reliable preventative. No foaming, and does not attack metals of boiler. Liberal terms to Agents. C. D. Fredricks, 587 Broadway, New York.

To ascertain where there will be a demand for new machinery or manufacturers' supplies read Boston Commercial Bulletin's manufacturing news of the United States. Terms $4·00 a year.

Cold Rolled—Shafting, piston rods, pump rods, Collins pat. double compression couplings, manufactured by Jones & Laughlins, Pittsburgh, Pa.

For mining, wrecking, pumping, drainage, and irrigating machinery, see advertisement of Andrews' Patents in another column.

Caldwell's Dryer dries Brick, Fire Brick, Tile, Peat, Whiting, etc., as fast as made. J. K. Caldwell & Co., Philadelphia.

Winans' boiler powder, 11 Wall st., N. Y., removes Incrustations without injury or foaming; 12 years in use. Beware of Imitations.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisemets at $1·00 a line, under the head of "Business and Personal."

All reference to back numbers should be by volume and page.

T. K. P., of Mass.—A steel horseshoe magnet may be charged by drawing the poles of another magnet from the poles of the first magnet to the bend, first connecting the poles of the magnet to be charged by its keeper or armature. Or place the poles of the magnet to be charged in contact with one already charged, laying both on a flat surface, and draw a bar of soft iron from the poles of the magnet to be charged toward the bend, keeping the bar in contact with both legs of the magnet, and repeating the process several times, after which turn over the magnet and perform the same operation on the other side. The latter process makes the strongest magnet. There are several other ways besides those described.

G. F. S., of N. Y.—The horse power of boilers depends upon the proportion of grate to heating surface, upon the heating surface, and the efficiency of draft. Assuming all these to be correctly proportioned, it is common to estimate 10 square feet of heating surface as being equal to the development of a horse power in land boilers. But when steam is used expansively, in the best engines this estimate will be found too large in a well constructed boiler. You will see that you have given no data whereby the horse power of your boiler can be estimated.

C. B., of Tenn.—We think an ice machine of the construction you propose might work, but how economically is a question which experiment only can determine. Your second query we cannot fully understand. Please state it more specifically. We think iron and steel might be made in the manner proposed, but there are no doubt practical difficulties which would need to be surmounted, and which only an experiment on a full scale can determine.

O. C., of Tenn.—Whether it will injure a steam boiler to let water stand in it a month when not in use, depends upon the character of the water. More or less rusting would take place with most kinds of water used in boilers. Your second query cannot be answered from the data given.

S. H., of N. Y.—The substance which collects about the manhole of your boiler is scale of carbonate of lime with organic matter. The substance collected from the wall appears to be nitrate of soda. Its exact composition can only be determined by analysis.

J. S. G., of N. Y.—A letter addressed to P. M. Parsons, in care of the editor of *Engineering,* London, England, will probably secure any further information you desire in regard to the white brass, described on page 343, current volume.

H. M. C., of Cal.—The table referred to is probably founded upon the law of falling bodies as mentioned in Bourne's Handbook of the Steam Engine, page 219. Ths same law is applicable to draft of chimneys. See Silliman's Physics, page 481.

G. E., of Stuttgart.—It is not uncommon in this country to raise and move brick houses of even larger dimensions than the one you name, the occupants meanwhile remaining in the building, and attending to their usual avocations.

C. M. H., of N. Y.—If we understand your query and diagram there would be more power obtained by exposing the sides of the collapsing cylinder as well as the piston, than by simply submitting the piston to pressure.

E. P. W., of Me.—Apothecaries generally use a paste made of gum tragacanth diosolved in water. Book-binders make use of a cement made of gum dextrine (British gum) dissolved in water.

J. F. K., of Pa.—You should send to some book store and procure a work on taxidermy, which will furnish you the information you desire.

C. C. B., of Pa.—The mineral you send is sulphuret of iron, of no value.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

DREDGE.—Andrew M. Hansen, Stockton, Cal.—The invention consists in cutting plates, placed at the ends of a revolving drum or chain wheel, or its journal, located at the lower extremity of the dredge frame; and cutting point or plows placed between the cutting plates, and attached to plates that are secured to the endless chain which revolves around said frame when said cutting plates and points are arranged to throw earth inward directly in the path of the buckets attached to the endless chains intermediately with the plates that bear the cutting points, in order that such buckets may have only loose earth to scoop up. This invention may be found advertised on another page.

SEED SOWER.—Samuel A. Scott, Griffin, Ga.—This invention consists in the combination of a box for containing seed, guano, etc., with a rock shaft furnished with pins and working in the slot in the bottom of the box, so as to keep the passage open, a shovel plow, for running furrows, in which the seed may drop, and hoes, for covering the seed after it has fallen into the furrow.

FRUIT DRYER.—John Hildebrand, Taneytown, Md.—This invention consists mainly in the combination of pans for holding fruit, whose bottoms are perforated, with drums which communicate with the pipe by which the products of combustion are conveyed away from a furnace, when the drums are so located as to radiate heat into the pans for the purpose of drying the fruit—the pans, drums, and furnace being inclosed within a suitable case.

SKATE FASTENING.—Moses Kinsey, Newark, N. J.—This invention has for for its object to provide a simple and reliable means for operating the toe clamps of skates, and consists in the peculiar arrangement of two pairs of pivoted levers, and in the combination therewith of the sliding clamps.

LOCK NUT.—Ulysses B. Vidal Philadelphia, Pa.—This invention has for its object to so construct nuts that the same may be readily locked, to prevent their working loose on the bolts. For railroad rails and cars, the invention is particularly applicable, as the jar of the moving trains is apt to work the nuts loose.

SHUTTLE THREAD-GUIDE AND TENSION.—M. C. Hawkins, Edinboro, Pa.—This invention relates to improvements in attachments to sewing-machine shuttles, for guiding the thread, and regulating the tension thereof, and consists in the application to a barset in the shuttle at the top, near one side, and parallel therewith, and hinged or pivoted at one end, of a curved thread guide, arranged to cause the thread to be delivered from the bobbin in lines perpendicular to the axis; and a spring tension plate and adjusting screw, so arranged that the tension may be adjusted without removing the shuttle from the race.

FRICTION CLUTCH.—Orrin Lull, Rochester, N. Y.—The object of this invention is to provide suitable means for throwing in and out of gear various kinds of machinery by means of friction, and it consists in moving laterally (by means of proper connections) a friction disk, so that an annular ring, attached to the pulley or gear wheel, is griped, for forming the connection or throwing machinery into gear.

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METAL TIP FOR SHOES AND BOOTS.—M. Pettingill, Le Roy, Minn.—This invention relates to a new and improved method of constructing copper and other metal tips for the toes of shoes and boots, and it consists in constructing the tip with tough malleable wires attached to its ends, and fastening the tip to the shoe or boot thereby.

STRAW STACKER.—O. Farrall, Daniels & Co., Piqua, Ohio.—This invention consists in the attachment of a straw stacker to a thrashing machine, in such a manner that it may be transported from place to place without being detached from the machine. It also consists in a straw stacker made in two or more sections, hinged together in such a manner, that the upper section or sections may be extended in line with the lower one, for use in connection with a thrashing machine, or may be folded under the lower section, and secured there safely for transportation without being detached from the machine.

BOLT THREADER.—G. W. Mingus, Pomeroy, Ohio.—This invention relates to an improved screw-thread cutter for threading bolts, and consists in a pair of die-carrying pieces hinged to a hollow mandrel, near one end, and arranged for their free ends, which project beyond the end of the mandrel, to work in a slotted transverse bar, or it may be a disk, having a set screw at one end of the slot, and an eccentric bar at the other, working against the outer faces of the die-carrying jaws, to hold them up to the work. The set screw makes the adjustment for the size of the bolt, and the eccentric releases the jaws to discharge the finished bolt; a solid die or wrench may be applied in place of the screw-cutting die, to turn a tap for tapping nuts.

MANUFACTURE OF GLOVES.—John L. Whitten, Essex, Vt.—This invention relates to improvements in the manufacture of gloves, the backs of which are made of woven stuff, and the fronts of leather, the leather also covering the sides, and, partially, the backs of the fingers; and it consists in arranging the leather, which partially covers the backs, and covers the sides of the fingers, so as to tip the fingers, at the ends, with leather, extending over the back of the finger in a manner to better protect the woven stuff of the back, and to avoid the converging of the seams by which the eather backs or sides, and the woven stuff backs are joined, at the tips of the fingers, which are greatly exposed to wear, and soon rip and fray out, spoiling the glove, while the other parts are good. It also consists in improved patterns for cutting these leather parts for the sides, and for partially covering the backs of the fingers. It also consists in cutting the leather side or back for the first finger, together with the leather front, for the same, and is an improved pattern for the same.

MEDICINE CASE.—Alphonzo Button, Dunkirk, N. Y.—This invention relates to improvements in the construction of medicine cases of that class wherein a web of canvas, leather, or other substance for the attachment of the vials, papers, or other things to be carried in the case, is attached to a spool, and wound on and off through a slot in a circular case; and it consists in the application to either one or both of the heads of the spools, in recesses in the said heads, of coiled springs, for winding up the web, and ratchet wheels and spring pawls to hold the springs when the webs are drawn out. It also consists in the arrangement of the web for holding small medicine vials, to be wound up with it on the reel; and the application thereto of a pocket-book.

HAWSE-HOLE COVER.—R. Liston, Albany, N. Y.—This invention relates to improvements in devices for closing the hawse holes of vessels to keep the water from beating upon the deck; and consists in the arrangement upon the inside of the bulwarks, of a circular, or other shaped cover, composed of two equal parts, hinged at the opposite sides, and meeting at the center, where recesses are formed in the edges for filling snugly around the two parts of the link of the cable when closed. One part is provided with a latch which swings down into catches on both parts to hold them closed, and both are provided with packing substance on the side towards the hole, also with hinge points which may be readily disconnected in cases of emergency.

ORE SEPARATOR.—Geo. Copeland, Denver, Colorado.—This invention relates to improvements in an ore separating apparatus, and consists in new and improved means for subjecting the pulverized ore to the action of distributed gusts of air, as it falls from a sieve to a hopper below, by which the gangue is prevented from falling with the heavier particles, and is thrown back to be thrown off by skimmers, and the dust is caused to be taken up by suckers and delivered to water spray for being moistened and conducted to a receiver, and retained for further operation.

HEMMERS.—M. C. Hawkins, Edinboro, Pa.—This inventon relates to improvements in hemmers for sewing machines, and consists in an improved arrangement on a notched plate, of the folder and tongue, whereby the cloth may be inserted more easily at the beginning, and without requiring the corner to be trimmed off; also, whereby a greater number of folds of the hem may be made. The invention also comprises an improved arrangement of the hem guide, whereby the hemming in circular lines is facilitated.

MODE OF FORMING GLASS INSULATORS.—J. M. Brookfield, Brooklyn, N. Y.—This invention relates to an improved mode of constructing glass insulators with internal screw threads for screwing them to their supports on the telegraph poles, and consists in forming the said threads by screwing a screw threaded former into the glass while in the mold, by which the exterior shape is formed, and while the glass is in a plastic state; the said former at the same time either wholly forming the socket in the glass, or giving the finishing shape to a socket previously partly formed, by a smooth plunger forced into the glass and withdrawn. The invention also comprises the combination with the former of a follower for pressing down into the top of the mold to prevent the overflow of the glass, and to give form to the bottom of the insulator.

COMBINED SAW SET, AND COW'S TAIL HOLDER.—J. Knight, Whitestown, N. Y.—This invention has for its object to furnish a simple and convenient device for holding a cow's tail while she is being milked, and which shall be so constructed as to be readily adjusted for use as a saw set.

STEAM PLOWS, ETC.—William Beckett, Kingston, Jamaica.—This invention has for its object to furnish an improved steam plowing apparatus, which shall be so constructed as to do its work thoroughly and well, and which shall be so constructed that it may be used as a power for various other agricultural and mechanical purposes.

PLATFORM SCALE—Albert Assmann, Rahway, N. J.—This invention relates to a self-indicating platform scale, which is made to operate entirely without the use of springs, and which is sufficiently simple to be sensitive to small weights.

TAR RESINATE.—F. M. Hillstream, Lawrence, Kansas.—The object of this invention is to prepare coal tar in such manner that it may be used for building, and for many purposes for which metal, clay, or other minerals are now employed.

SIPHON.—Seth C. Catlin, Cleveland, Ohio.—This invention relates to a new and useful improvement in siphons for drawing or transferring liquids from one vessel to another, and for all the purposes for which siphons are used, and it consists in an extension tube and valve chamber above the crown of the siphon.

DOOR KNOBS.—George Jones, Peekskill, N.Y.—This invention relates to a new and useful improvement in knobs for doors, and consists in an exterior open work, metallic, hemispherical outer end, and an interior hemisphere or plate of other forms of metal or other material, and in making the bulb or knob of two hollow hemispherical parts with one intervening hemisphere or semi-bulb or plate.

STEAM PLOW.—M. N. Lynn, New Albany, Ind.—This invention relates to improvements in steam machines for drawing plows, and other uses, and consists, first in an improved construction of the frames, mainly of tubing, for the purpose of providing the greatest amount of strength with the least weight of metal; also for utilizing the space within the main tubes of the frame for water tanks, for containing the supply water for the boiler; second, in an improved arrangement of the engines, propelling shafts, and gears with the frame and driving wheels, having for its object to work an economy and simplicity of construction; and, third, the invention consists in the combination with the traction wheels of a series of pushing legs of peculiar construction and arrangement, as auxilliary to the said traction wheels for use in soft ground, or at any time when the said wheels fail for any cause to adhere sufficiently.

RECTIFYING APPARATUS.—Luke S. Snediker, New York city.—This invention relates to a new apparatus for disturbing and heating the alcoholic liquors and the coal in rectifying machinery, so that thereby the absorption of the fusel oil will be more rapidly and thoroughly produced. The invention consists in constructing the agitating machinery with hollow arms, through which steam is conducted into the liquor, so that thereby both the heating and the agitating device will be most intimately connected.

COAL SCUTTLE.—Charles Hodgetts, Williamsburgh, N. Y.—This invention has for its object to provide a coal scuttle with a strong bottom and lower part, and a convenient fastening for the bottom and foot. The invention consists in fitting the bottom with an upward projecting flange into the scuttle and upon the supporting base, and in riveting it to the said base.

HOISTING JACK.—Edwin A. Castellaw, Savannah, Ga.—This invention relates to a new and useful improvement in a jack for hoisting weights or heavy bodies.

CAN-SOLDERING APPARATUS.—Jacob Gulden, Keyport, N. J.—This invention relates to a new apparatus for soldering the seams of sheet metal cans, and consists in the use of a tubular furnace, which is combined with sliding soldering irons that work in the tubes for the purpose of being heated therein. The invention consists also in the application to the apparatus of a set of springs for holding the cams on the blocks that are prepared for them on the sides of the furnace.

NEEDLE THREAD TENSION.—M. C. Hawkins, Edinboro, Pa.—This invention relates to improvements in needle-thread tension devices for sewing machines, and consists in an arrangement in the axis of a short tube, suitably constructed and arranged for attachment to the needle-supporting arm of the machine transversely thereof; of an adjusting screw carrying two tension plates or disks at one end of the tube, and having within the tube an adjusting nut and tension spring, so arranged that by turning the screw which has a milled head at the ends supporting the tension plates, the tension may be varied as required, the said nut being capable of moving along the screw in the tube, but incapable of turning with it. The tube is also provided with a guide arm through which the thread passes to the said tension plates.

LOG LOADER.—John Harvey, Chanticleer, Ohio.—The object of this invention is to provide efficient means for loading or rolling logs or other heavy weights (more especially saw logs), but applicable to other purposes.

SEAT HOLDER.—Johiel Jackson, Columbus, Wis.—This invention has for its object to furnish an improved holder for holding the rails of a seat while being made, and which may be adjusted for holding larger or smaller seats, as may be required.

CHURNING APPARATUS.—Nathan S. Hazen, La Fayette, Ind.—This invention has for its object to furnish an improved churning apparatus, which shall be simple in construction, and effective in operation, doing its work quickly and thoroughly.

COMBINATION TOOL.—George W. Stockwell, Natchez, Miss.—This invention relates to a new household tool, which contains a majority of the devices generally required for domestic purposes. The invention consists in the combination of a handle, hammer, and clamping screw with several other useful instruments.

WHEELS FOR TINNERS' BEADING MACHINES.—Benjamin S. Partridge, Pilatka, Fla.—This invention has for its object to provide machinery by which the shoulder required at the lower part of a coffee machine dripper can be formed; and also, the lower edge turned in, without requiring the addition to such dripper of an extra lower piece.

LIFE BOATS.—Theophile Masac, Good Hope Plantation, La.—This invention has for its object to furnish an improved life boat, strong, simple in construction, and effective in use, and which shall be so constructed that it may be closed up into small compass, adapting it to be taken by the passenger into his private cabin, and kept stacked, ready for an emergency.

PONY CARRIAGE PHAETON.—John C. Ham, New York city.—This invention has for its object to improve the construction of pony carriage phaetons, so that the rumble, or servant's seat may be removed from its place in the rear of the carriage body, and placed beneath said body in such a way that when thus placed it may not disfigure the carriage, but rather increase the beauty of the lines of the carriage, and improve its appearance.

MACHINE FOR ENGRAVING, DRILLING, ETC.—Charles J. Coulter, Seville, Ohio.—This invention has for its object to furnish an improved machine which shall be so constructed and arranged that it may be used for engraving, for which use it is especially designed, for drilling straight or oblique holes, and for various other uses.

PIPE JOINT.—Robert B. Coar, Jersey City, N. J.—This invention has for its object to furnish an improved pipe joint, which shall be so constructed that should the joint be found to leak, the water may be drawn off and the joint packed with soft metal from the inside of the pipe.

NUT LOCK.—Henry Beagle, Jr., Philadelphia, Pa.—This invention has for its object to furnish an improved nut lock, designed more especially for locking the nuts of fish plate bolts, but equally applicable for use in other places where the bolts and nuts are exposed to a continual jarring.

BLAST FURNACES.—James Thomas, Parryville, Pa.—This invention has for its object to provide an improved apparatus for automatically raising and lowering the bell that closes the top of the furnace and distributes the stock, so that it will be raised to close the furnace when the pressure of the blast is on, and be lowered when the pressure of the blast is off, thus guarding against danger from explosion when the blast is off the furnace.

AUTOMATIC BOILER FEEDER.—Valerius D. Anderson, Kewanee, Ill.—This invention has for its object to furnish an improved automatic feeder for steam boilers used for heating buildings, steaming feed for stock, and other uses where a low pressure of steam is required.

MEDICAL COMPOUND.—Philip Becker, South Bethlehem, Pa.—This invention consists in a new compound of medicinal substances for the cure of fever and ague, and other kindred diseases.

MACHINERY FOR TOWING CANAL BOATS AND OTHER VESSELS ON A FIXED ROPE OR CHAIN.—Baron Oscar De Mesnil, Brussels, Belgium, and Max Eyth, Stuttgart, Würtemberg.—This invention has for its object to provide simple means, whereby canal tug boats and other vessels can be moved forward along a fixed rope or chain, by the aid of machinery provided on such boat.

Official List of Patents.

Issued by the United States Patent Office.

FOR THE WEEK ENDING May 31, 1870.

Reported Officially for the Scientific American

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103,536.—COMPOSITION FELTING FOR COVERING ROOFS, SHIPS' BOTTOMS, ETC.—Thomas R. Abbott, Lowell, Mass.

103,537.—CULTIVATOR.—Henry A. Adams, Sandwich, Ill.

103,538.—BINDING ATTACHMENT FOR SEWING MACHINES. Lauritz Anderson, Chicago, Ill. Antedated May 3, 1870.

103,539.—BOILER FEEDER AND LOW WATER ALARM.—V. D. Anderson, Kewanee, Ill.

103,540.—BARREL TILTER.—George Armstrong, Liverpool, England, assignor to himself and Wm. H. Eckert, Oswego, N. Y.

103,541.—WEIGHING SCALE.—Albert Assman, Rahway, N. J.

103,542.—LOCK.—Moses O. Baker, New York city.

103,543.—GREEN CORN CUTTER.—Volney Barker, Otisfield, Me.

103,544.—NUT LOCK.—Henry Beagle, Jr., Philadelphia, Pa.

103,545.—MEDICAL COMPOUND.—Philip Becker, South Bethlehem, Pa.

103,546.—WORKMAN'S SCAFFOLD.—Wm. H. Berger, Danville, Pa.

103,547.—SASH HOLDER AND BALANCE.—George W. Bishop, Saratoga Springs, N. Y.

103,548.—SPRING BED BOTTOM.—Orris Blake, Peru, Ind.

103,549.—NEEDLE FOR SEWING MACHINE.—J. B. Blanchard, Boston, Mass.

103,550.—TIGHTENING WHEEL TIRE.—Simeon R. Bolton, Prescott, Wis.

103,551.—REFRIGERATING OYSTER CAN.—Alfred Booth, Chicago, Ill.

103,552.—HAY AND STRAW CUTTER.—Adolph C. Both, Hesse Cassel, Germany.

103,553.—MODE AND MATERIAL FOR CONSTRUCTING FLOORS, CEILINGS, ROOFS, ETC.—Gabriel Charles Bouziat, Vincennes, France.

103,554.—COMPOSITION FOR COATING SHINGLES AND CLAPBOARDS.—Otis E. Bowen, Needham, Mass.

103,555.—MODE OF FORMING INSULATOR.—James M. Brookfield, Brooklyn, N. Y.

103,556.—CORSET SKIRT SUPPORTER.—J. W. Brooks, Boston, Mass.

103,557.—HAY AND COTTON PRESS.—B. R. Brown and James Toone, Jr., Jackson, Tenn.

103,558.—DINNER PAIL AND LANTERN.—Nelson C. Burnap Argusville, N. Y.

103,559.—BELL FOR CLOCKS.—Leonard C. Butch, Lancaster, Ohio.

103,560.—MOLDING PIT FOR CASTING CYLINDERS AND PIPES.—Robert Cartwright, Chicago, Ill.

103,561.—CORN HUSKING MACHINE.—Erastus H. Carver, Preble, N. Y.

103,562.—TREADLE FOR SEWING MACHINE.—Henry J. Case, Auburn, N. Y.

103,563.—HOISTING JACK.—Edwin A. Castellaw, Savannah Ga.

103,564.—SIPHON.—Seth C. Catlin, Cleveland, Ohio.

103,565.—STAND AND CLOTHES DRYER.—M. C. Charles, Hope, Ind.

103,566.—SHOEMAKERS' TOOL.—Alfred Clarke and Arthur Clarke, Philadelphia, Pa.

103,567.—PIPE JOINT.—Robert B. Coar, Jersey City, N. J.

103,568.—RESAWING MACHINE.—Lucius J. Cobb, Chicago, Ill.

103,569.—MACHINERY FOR CALENDERING AND POLISHING PAPER.—Phineas Coburn, East Walpole, Mass.

103,570.—FRUIT BASKET.—Eastman Colby, Brockport, N. Y.

103,571.—BUTTON.—J. F. Collins and Arthur Neill, New York city. Antedated May 27, 1870.

103,572.—COLLECTING, SEPARATING, AND PURIFYING THE GASES FROM FURNACES.—J. H. Connelly and John McLure, Wheeling, West Va.

103,573.—CARRIAGE AND RAILROAD CAR WHEELS.—Almond F. Cooper, San Francisco, Cal.

103,574.—ORE SEPARATOR.—George Copeland, Denver, Colorado Territory.

103,575.—MACHINE FOR CUTTING, PRINTING, AND FOLDING PAPER.—William Pinckney Corsa, Catskill, N. Y.

103,576.—ENGRAVING MACHINE.—Chas. J. Coulter, Seville, Ohio.

103,577.—MANUFACTURE OF SHEET IRON.—Isaac E. Craig, Camden, Ohio.

103,578.—EMBROIDERY ATTACHMENT FOR SEWING MACHINES.—Edwin J. Cubley, Chicago, Ill.

103,579.—SETTING GAS RETORT.—Thomas Curley, Wilmington, Del.

103,580.—MANUFACTURE OF ARTIFICIAL FUEL.—E. J. De Smedt (assignor to New York Improved Anthracite Coal Company) New York city.

103,581.—LAYING ASPHALT OR CONCRETE PAVEMENT ON ROADS.—E. J. De Smedt (assignor to the New York Improved Anthracite Coal Company), New York city.

103,582.—ASPHALT ROADS AND PAVEMENTS.—Edward J. De Smedt (assignor to the New York Improved Anthracite Coal Company), New York city.

103,583.—GATE.—Benjamin F. Dickey, Marshall, Mich.

103,584.—PREVENTING REVERSE MOTION IN SEWING MACHINES.—David A. Dickinson, Baltimore, Md.

103,585.—TONGS FOR RIGGING.—George Dohn, Sacramento, Cal.

103,586.—LATCH.—Thomas Dolan, Albany, N. Y. Antedated May 20, 1870.

103,587.—BEARING FOR SHEAVES.—W. W. Eastman Meadville, Pa.

103,588.—REVOLVING BACK BAND FOR HARNESS SADDLES.—Gustavus Elbel, Pittsburgh. Pa.

103,589.—BRICK CART.—James Evans, Philadelphia, Pa.

103,590.—ATTACHING DOOR KNOBS TO THEIR SPINDLES.—John Evans, New Haven, Conn.

103,591.—MANUFACTURE OF BRICKS, TILES, ETC., FROM SLAG.—François Fabre, Marseilles, France.

103,592.—FILTER.—Enoch S. Farson, Philadelphia, Pa.

103,593.—READING STAND.—Andrew C. Flint, Chelsea, Mass.

103,594.—TAP FOR RUBBER BOOTS.—Francis Flynn, Smithfield, assignor to the Woonsocket Rubber Company, Woonsocket, R. I.

103,595.—DITCHING MACHINE.—Robert G. Forsyth, Clayton, Ind.

103,596.—EXHAUST NOZZLE.—Charles H. Frisbie, Chicago, Ill.

103,597.—HOT BLAST OVEN.—Job Froggett, Youngstown Ohio.

103,598.—LAMP BURNER.—Jim B. Fuller, Norwich, Conn.

103,599.—PERCUSSION FUSE.—William Gardner, San Francisco, Cal.

103,600.—LOOM.—Charles W. Gilbert, Worcester, Mass.

103,601.—BREAD CUTTER.—George D. Goodsell and Noyes E. Babcock, Rockford, Ill.

103,602.—APPARATUS FOR EVAPORATING LIQUIDS.—George F. Grey, Brooklyn, N. Y.

103,603.—SOLDERING APPARATUS.—Jacob Gulden, Key Port, N. J.

103,604.—METHOD OF DISTILLING IN VACUO.—Frederic Gutzkow, San Francisco, Cal.

103,605.—PONY CARRIAGE PHAETON.—John C. Ham, New York city.

103,606.—DOOR BOLT.—William H. Hart, New Britain, Conn.

103,607.—COAL BARGE.—Roger Hartley, Pittsburgh, Pa., assignor to the American Coal Barge Company, Bristol, Conn.

103,608.—LOG LOADER.—John H. Harvey, Chanticleer, Ohio.

103,609.—TENSION DEVICE FOR NEEDLE THREAD IN SEWING MACHINES.—Moses Champero Hawkins, Edinborough, Pa.

103,610.—SHUTTLE FOR SEWING MACHINE.—Moses Champero Hawkins, Edinborough, Pa.

103,611.—HEMMER FOR SEWING MACHINE.—Moses Champero Hawkins, Edinborough, Pa.

103,612.—CHURN.—Nathan S. Hazen, La Fayette, Ind.

103,613.—WATER ELEVATOR.—Morrison Heady, Spencer county, Ky.

103,614.—COMPOSITION MADE FROM COAL TAR.—Francis M. Hillstream, Lawrence, Kansas.

103,615.—COAL SCUTTLE.—Charles Hodgetts, Williamsburgh, N. Y.

103,616.—TEMPLE FOR LOOM.—William H. Howard, Media, Pa.

103,617.—SELF-ACTING LUBRICATOR.—William B. Howe, Troy, N. Y.

103,618.—RAILWAY-CAR COUPLING.—George C. Hugg, Berlin, N. J.

103,619.—CHAIN-PUMP BUCKET.—F. P. Hunt, Northborough, Mass.

103,620.—SEAT HOLDER.—Johiel Jackson, Columbus, Wis.

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103,621.—COOKING STOVE.—Benjamin F. Johnson, Troy, N. Y.
103,622.—DRYER.—I. B. Kinkead, Watertown, Ohio.
103,623.—SKATE-FASTENING.—Moses Kinsey, Newark, N. J.
103,624.—CORK-SAVING BOTTLE FASTENING.—C. L. Knecht, Lower St. Clair Township, Pa.
103,625.—DINING TABLE.—James L. Knight, Tracy Creek, N. Y.
103,626.—GRINDING MILL.—Philip Kraus, Augusta, Ga.
103,627.—PICTURE HANGER.—George Lamb, Boston, Mass.
103,628.—LANTERN.—L. W. Leary, Norfolk, Va. Antedated May 24, 1870.
103,629.—FASTENING FOR GATES.—John Lintner, Indianapolis, Ind.
103,630.—HAWSE-HOLE COVER.—Robert Liston, Albany, N. Y.
103,631.—HEAD REST.—Caleb V. Littlepage, Austin, Texas.
103,632.—PUMP-ROD ATTACHMENT.—H. H. Locke, Pleasantville, Pa.
103,633.—HARVESTER-KNIFE GRINDER.—Thomas Loring, Blackwoodtown, N. J.
103,634.—FRICTION CLUTCH.—Orrin Lull, Rochester, N. Y.
103,635.—STEAM PLOW.—M. N. Lynn, New Albany, Ind.
103,636.—CART SADDLE.—Charles K. Marshall, New Orleans, La.
103,637.—LIFE BOAT.—Theophile Masac, Good Hope Plantation, La.
103,638.—COTTON GIN.—Robert McKenna, Whites' Station, Tenn.
103,639.—FARMERS' BOILER.—Allen N. Merrill, Batavia, Ill.
103,640.—APPARATUS FOR PAINTING.—Asa P. Merritt, Charlotte, Mich.
103,641.—PRIMER FOR CARTRIDGE.—I. M. Milbank, Greenfield Hill, Conn.
103,642.—BOLT THREADER.—Gideon W. Mingus, Pomeroy, Ohio.
103,643.—TENSION WHEEL FOR SEWING MACHINE.—J. H. Mooney (assignor to Samuel Hill), San Francisco, Cal.
103,644.—OIL-CAN SPOUT.—Samuel Moyle, Jr. (assignor to himself and A. J. Carrier), Bridgeport, Conn.
103,645.—SPIRAL FASTENING.—Chas. S. Muscroft, Cincinnati, Ohio.
103,646.—SPRING BED BOTTOM.—Charles W. Mutell, Springfield, Mass.
103,647.—VALVE-GEAR FOR LOCOMOTIVES.—Adolph Onslow, Jersey City, N. J.
103,648.—WHEEL FOR TINNERS' BEADING MACHINES.—B. S. Partridge (assignor to himself and W. A. Stafford), Pilatka, Fla. Antedated May, 19, 1870.
103,649.—STEAM ENGINE CONNECTION.—Leonard Phleger, Philadelphia, Pa. Antedated May 19, 1870.
103,650.—TREATING SLAG, FROM IRON AND GLASS FURNACES, FOR PRODUCING A USEFUL MATERIAL.—A. A. Player and Henry McAllister, Jr., Philadelphia, Pa., administrators of John Player, deceased.
103,651.—HOT-BLAST OVEN.—A. A. Player and Henry McAllister, Jr., Philadelphia, Pa., administrators of John Player, deceased.
103,652.—LAMP EXTINGUISHER.—David J. Powers, Chicago, Ill.
103,653.—WRENCH.—T. C. Purington, Lincoln, Cal., assignor to himself and A. Mayoux.
103,654.—APPARATUS FOR TEACHING STUDENTS THE USE OF TELEGRAPHIC INSTRUMENTS.—D. W. Putt (assignor to himself, Walter G. Brownson, and Philip Brewer), Wellsville, Ohio.
103,655.—COOKING STOVE.—Josiah M. Reed, Boston, Mass.
103,656.—WRENCH.—Mathias Redlinger, Freeport, Ill.—Antedated May, 19, 1870.
103,657.—WATER WHEEL.—William W. Richardson, Chicago, Ill.
103,658.—SPRING BED BOTTOM.—Gideon B. Richmond, Charlestown, Mass.
103,659.—DOVETAILING CHISEL.—N. H. Robinson, Owasso, Mich.
103,660.—HAMMER.—Oliver Rock, Hudson, Mass.
103,661.—COMPOSITON FOR PREVENTING INCRUSTATION IN STEAM BOILERS.—J. G. Rogers, Madison, Ind.
103,662.—PREVENTING INCRUSTATION IN STEAM BOILERS.—J. G. Rogers, Madison, Ind.
103,663.—PLOW.—Ruffin Roles, Carey, N. C.
103,664.—SEWING MACHINE NEEDLE FOR EMBROIDERING.—Israel M. Rose, Brookhaven, N. Y.
103,665.—APPARATUS TO EFFECT THE HYDRATION OF AIR IN HEATED APARTMENTS.—P. J. Schopp, Louisville, Ky.
103,666.—SEED SOWER.—S. A. Scott, Griffin, Ga.
103,667.—HYDRAULIC HOUSING FOR ROLLS.—G. H. Sellers, Wilmington, Del.
103,668.—KITE STRING HOLDER.—George G. Sheldon, Chicago, Ill.
103,669.—TIRE-SETTING MACHINE.—Andrew Shogren and H. A. Adams, Sandwich, Ill.
103,670.—MACHINE FOR CUTTING DOVETAILS.—W. E. Sibley, Weston, Mass.
103,671.—WASHING MACHINE.—John Sirrine, Trumansburg, N. Y.
103,672.—SAFETY STOVE.—Charles J. Smith, Norfolk, Va.
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103,674.—MICA FRAME FOR STOVES.—Gaylord S. Stanard, Buffalo, N. Y.
103,675.—MEDICAL COMPOUND.—J. T. Stewart, Peoria, Ill., assignor to S. R. Whitlow.
103,676.—OIL BOXES FOR CAR AXLES.—T. B. Stewart, Hartford, Conn.
103,677.—SAWING MACHINE.—Nicholas Stilwell, Newark, N. J. Antedated May 31, 1870.
103,678.—COMBINATION TOOL.—Geo. W. Stockwell, Natchez, Miss.
103,679.—SAFETY WHIFFLETREE.—Melvin Stone, Vermillion, Ohio.
103,680.—GRAIN SEPERATOR.—Orrin Stone, Ionia, Mich.
103,681.—MACHINE FOR MAKING HORSESHOES.—J. G. Stowe, Providence, R. I.
103,682.—BOOK REST.—Cornelius Sullivan, Boston, Mass.
103,683.—SAFE AND VAULT.—Timothy J. Sullivan, Albany, N. Y.
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103,686.—STOVE-PIPE DAMPER.—William Taylor, Lowell, Mass.
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103,688.—CORN AND COTTON PLANTER, FERTILIZER DISTRIBUTER, COTTON CHOPPER, AND CULTIVATOR COMBINED.—James F. Tucker, Monticello, Fla.
103,689.—LOCK NUT.—U. B. Vidal, Philadelphia, Pa.
103,690.—LOW WATER INDICATOR FOR BOILERS.—Chas. S. Watson, Philadelphia, Pa. Antedated January 29, 1870.
103,691.—HORSE HAY RAKE.—David H. Weaver, South Bend, Ind.
103,692.—RAILWAY RAIL CHAIR.—J. S. Weimer, Pleasant Hill, Ohio.
103,693.—PROCESS OF WELDING AND TEMPERING SHEAR-BLADES.—Hermann Wendt, Elizabeth, N. J., assignor to Henry Seymour & Co., New York city.
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103,776.—SCREW-THREADING MACHINE.—T. T. Prosser, Chicago, Ill.
103,777.—PLOW.—W. S. Rabb, Winnsborough, S. C. Antedated May 19, 1870.
103,778.—CAR SPRING.—Frederic W. Rhinelander, New York city.
103,779.—CORN HARVESTER.—J. E. Rice, Moline, assignor to himself and A. A. Rice, Chicago, Ill.
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103,818.—SPRING WEIGHING APPARATUS.—Andrew Morse, Skowhegan, Me., assignor to himself and Thomas Odiorne, Cambridge, Mass.
103,819.—DOOR LATCH.—John H. Vickers (assignor to W. A. Aiken), Norwich, Conn.

REISSUES.

3,998.—MACHINE FOR FORGING OR ROLLING SCREW THREADS UPON METAL BOLTS.—John Cochrane, Wall township, N. J.—Patent No. 63,364, dated March 24, 1867.
3,999.—STEAM CONDENSER.—John Houpt, Springtown, Pa.—Patent No. 102,005, dated April 19, 1870.
4,000.—STEAM GENERATOR.—Wm. Lowe, Bridgeport, Conn.—Patent No. 65,405, dated June 4, 1867.
4,001.—CONSTRUCTION OF SAFES.—F. H. Williams, Syracuse, N. Y.—Patent No. 85,978, dated Jan. 19, 1869.
4,002.—NEEDLE FOR SEWING MACHINES.—Mary P. Carpenter, San Francisco, Cal.—Patent No. 99,158, dated Jan. 25, 1870.
4,003.—TWINE CUTTER.—Thomas B. Doolittle, Bridgeport, Conn., assignee of Geo. C. Taft.—Patent No. 99,494, dated February 1, 1870.
4,004.—HEATING STOVE.—J. M. French, Jr., Rochester, N. Y., assignee, by mesne assignments, of D. L. Stiles.—Patent No. 40,663, dated Nov. 17, 1863.
4,005.—CAR VENTILATOR.—M. T. Hitchcock, Springfield, Mass.—Patent No. 74,534, dated Feb. 18, 1868.
4,006.—COVERS FOR STOVES.—D. G. Littlefield, Albany, N. Y.—Patent No. 53,251, dated March 13, 1866.
4,007.—THRASHING MACHINE.—John O'Ferrall and Thos. L. Daniels, Piqua, Ohio, assignees of A. B. Crawford.—Patent No. 29,865, dated Sept. 4, 1860.
4,008.—HARVESTER.—John G. Perry, Kingston, R. I.—Patent No. 86,584, dated Feb. 2, 1869.
4,009.—Division B.—SCREEN FOR BASE-BURNING FIREPLACE HEATER.—David Stuart and Richard Peterson, Philadelphia, Pa., assignees of David Stuart and Lewis Bridge.—Patent No. 79,215, dated June 23, 1868.

DESIGNS.

4,075.—LABEL.—G. F. Gantz, New York city.
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4,077.—METALLIC BRACKET.—Albert D. Judd, New Haven, Conn.
4,078 and 4,079.—TRADE MARK.—G. W. Langhorne, John D. Langhorne, and N. B. Johnston, Lynchburg, Va. Two Patents.
4,080.—UMBRELLA STAND.—James C. Sidney, Philadelphia, Pa.
4,081 to 4,084.—CARPET PATTERN.—Robert R. Campbell (assignor to Lowell Manufacturing Company), Lowell, Mass. Four Patents.
4,085.—CHANDELIER.—Pietro Cinquini (assignor to Bradley & Hubbard), West Meriden, Conn.
4,086.—LAMP BRACKET.—Pietro Cinquini (assignor to Bradley & Hubbard, West Meriden), Conn.
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4,089.—LAMP.—R. S. Merrill, Hyde Park, Mass.
4,090 to 4,094.—CARPET PATTERN.—Elemir J. Ney, Dracut, assignor to Lowell Manufacturing Co., Lowell, Mass. Five Patents.

EXTENSIONS.

SAW MILL DOGS.—G. W. Hill, of Olean, N. Y.—Letters Patent No. 14,841, dated May 6, 1856.
CONTINUOUS SHEET METAL LATHING SURFACES.—John B. Cornell, of New York city.—Letters Patent No. 14,854, dated May 13, 1856.
VENTILATING DAMPERS FOR STOVES.—John Magee, of Chelsea, Mass.—Letters Patent No. 14,940, dated May 20, 1856; reissue No. 1,355, dated Nov. 18, 1862.
MAKING BRASS KETTLES.—Frederick J. Seymour, of Wolcottville, Conn.—Letters Patent No. 14,887, dated May 13, 1856; reissue No. 1,183, dated May 14, 1861.
SHINGLE MACHINE.—Edward Hedley, of Philadelphia, Pa.—Letters Patent No. 14,914, dated May 20, 1856.
SURFACE CONDENSERS FOR STEAM ENGINES.—D. D. Foley, of Washington, D. C., assignee by mesne assignments, of Jas. M. Miller.—Letters Patent No. 14,923, dated May 20, 1856.
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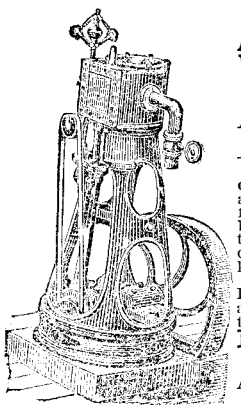

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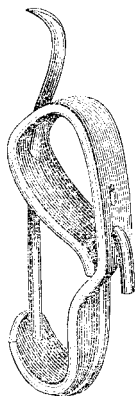

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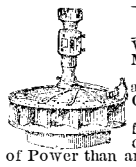

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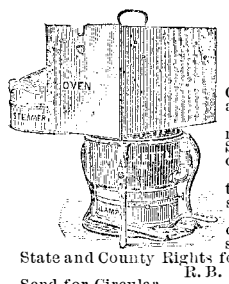

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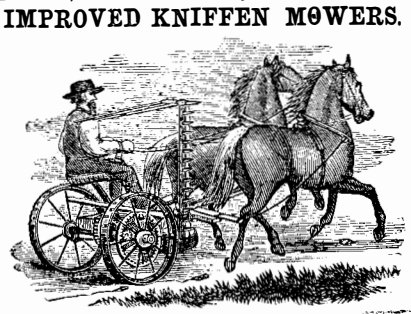

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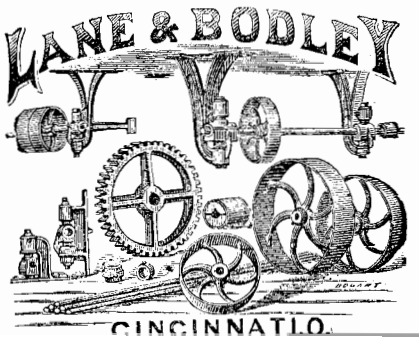

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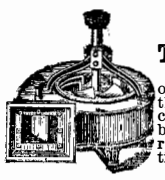

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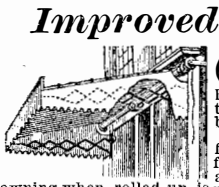

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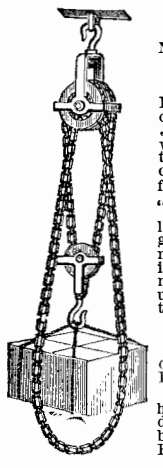

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